UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-Q

(Mark One)

☒ **Quarterly Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**

For the Quarterly Period Ended September 30, 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

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	☒			Accelerated filer	☐
		Non-accelerated filer	☐		
Smaller reporting company	☐			Emerging growth company	☐

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 is a shell company (as defined in Rule 12b-2 of the Exchange Act).

☐ Yes ☒ No

The registrant had 59,295,496 common stock outstanding as of October 28, 2022.

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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 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
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:

AOCI	Accumulated Other Comprehensive Income
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
LIBOR	London Interbank Offered Rate
SEC	Securities and Exchange Commission
SOFR	Secured Overnight Financing Rate

Industry and Other Defined Terms:

BlackRock	Funds and accounts managed by BlackRock
the CARES Act	Coronavirus Aid, Relief, and Economic Security Act
COVID-19	Coronavirus Disease 2019
CST	Clean Sugar Technology™
DOE	Department of Energy
E10	Gasoline blended with up to 10% ethanol by volume
E15	Gasoline blended with up to 15% ethanol by volume
EIA	U.S. Energy Information Administration
EPA	U.S. Environmental Protection Agency
FFV	Flexible-fuel vehicle
LCFS	Low Carbon Fuel Standard
MmBtu	Million British Thermal Units
Mmg	Million gallons
MSC™	Maximized Stillage Coproducts produced using process technology developed by Fluid Quip Technologies LLC
MTBE	Methyl tertiary-butyl ether
RFS	Renewable Fuels Standard
RIN	Renewable identification number
RVO	Renewable volume obligation
SRE	Small refinery exemption
U.S.	United States
USDA	U.S. Department of Agriculture

PART 1 – FINANCIAL INFORMATION

Item 1. Financial Statements.

GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

(in thousands, except share amounts)

	September 30, 2022	December 31, 2021
	(unaudited)	
ASSETS		
Current assets		
Cash and cash equivalents	$ 420,838	$ 426,220
Restricted cash	66,610	134,739
Marketable securities	24,989	124,859
Accounts receivable, net of allowances of $204 and $682, respectively	118,362	119,961
Income taxes receivable	1,072	911
Inventories	258,852	267,838
Prepaid expenses and other	13,572	16,483
Derivative financial instruments	31,318	26,738
Total current assets	935,613	1,117,749
Property and equipment, net of accumulated depreciation and amortization of $611,773 and $567,027, respectively	1,016,349	893,517
Operating lease right-of-use assets	63,464	64,042
Other assets	86,114	84,447
Total assets	$ 2,101,540	$ 2,159,755
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities		
Accounts payable	$ 123,035	$ 146,063
Accrued and other liabilities	45,947	56,980
Derivative financial instruments	25,883	43,244
Operating lease current liabilities	17,800	16,814
Short-term notes payable and other borrowings	206,102	173,418
Current maturities of long-term debt	1,835	35,285
Total current liabilities	420,602	471,804
Long-term debt	495,269	514,006
Operating lease long-term liabilities	48,934	49,795
Other liabilities	23,501	22,131
Total liabilities	988,306	1,057,736
Commitments and contingencies (Note 13)		
Stockholders' equity		
Common stock, $0.001 par value; 150,000,000 shares authorized; 62,087,927 and 61,840,434 shares issued, and 59,282,868 and 53,595,978 shares outstanding, respectively	62	62
Additional paid-in capital	1,107,786	1,069,573
Retained deficit	(103,801)	(15,199)
Accumulated other comprehensive loss	(10,831)	(12,310)
Treasury stock, 2,805,059 and 8,244,456 shares, respectively	(31,174)	(91,626)
Total Green Plains stockholders' equity	962,042	950,500
Noncontrolling interests	151,192	151,519
Total stockholders' equity	1,113,234	1,102,019
Total liabilities and stockholders' equity	$ 2,101,540	$ 2,159,755

See accompanying notes to the consolidated financial statements.

GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF OPERATIONS

(unaudited and in thousands, except per share amounts)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	**2021**	**2022**	**2021**
Revenues				
Product revenues	$ 946,852	$ 745,240	$ 2,733,477	$ 2,019,006
Service revenues	8,125	1,551	15,329	5,843
Total revenues	954,977	746,791	2,748,806	2,024,849
Costs and expenses				
Cost of goods sold (excluding depreciation and amortization expenses reflected below)	956,857	730,179	2,650,680	1,878,820
Operations and maintenance expenses	6,287	5,162	18,012	17,153
Selling, general and administrative expenses	29,066	26,022	90,042	72,923
Loss (gain) on sale of assets, net	—	1,823	—	(31,245)
Depreciation and amortization expenses	24,647	28,280	66,013	69,493
Total costs and expenses	1,016,857	791,466	2,824,747	2,007,144
Operating income (loss)	(61,880)	(44,675)	(75,941)	17,705
Other income (expense)				
Interest income	1,763	25	2,640	496
Interest expense	(9,576)	(9,488)	(26,182)	(60,225)
Other, net	(182)	(440)	28,394	(1,680)
Total other income (expense)	(7,995)	(9,903)	4,852	(61,409)
Loss before income taxes and income (loss) from equity method investees	(69,875)	(54,578)	(71,089)	(43,704)
Income tax benefit (expense)	1,888	(7)	146	2,914
Income (loss) from equity method investees	84	174	(112)	517
Net loss	(67,903)	(54,411)	(71,055)	(40,273)
Net income attributable to noncontrolling interests	5,623	5,211	17,547	16,151
Net loss attributable to Green Plains	$ (73,526)	$ (59,622)	$ (88,602)	$ (56,424)
Earnings per share:				
Net loss attributable to Green Plains - basic and diluted	$ (1.27)	$ (1.18)	$ (1.62)	$ (1.27)
Weighted average shares outstanding:				
Basic and diluted	57,677	50,482	54,550	44,581

See accompanying notes to the consolidated financial statements.

GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

(unaudited and in thousands)

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	**2021**	**2022**	**2021**
Net loss	$ (67,903)	$ (54,411)	$ (71,055)	$ (40,273)
Other comprehensive income, net of tax:				
Unrealized gains on derivatives arising during the period, net of tax expense of ($2,494), ($171), ($836) and ($260), respectively	7,740	538	2,591	820
Reclassification of realized losses (gains) on derivatives, net of tax expense (benefit) of $536, $62, $359 and ($750), respectively	(1,662)	(194)	(1,112)	2,390
Total other comprehensive income, net of tax	6,078	344	1,479	3,210
Comprehensive loss	(61,825)	(54,067)	(69,576)	(37,063)
Comprehensive income attributable to noncontrolling interests	5,623	5,211	17,547	16,151
Comprehensive loss attributable to Green Plains	$ (67,448)	$ (59,278)	$ (87,123)	$ (53,214)

See accompanying notes to the consolidated financial statements.

GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS

(unaudited and in thousands)

	Nine Months Ended September 30,	
	2022	2021
Cash flows from operating activities:		
Net loss	$ (71,055)	$ (40,273)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	66,013	69,493
Amortization of debt issuance costs	3,214	6,957
Gain on sale of assets, net	—	(31,245)
Inventory lower of cost or net realizable value adjustment	11,177	—
Loss on extinguishment of debt	419	32,645
Deferred income taxes	(477)	(3,008)
Stock-based compensation	6,646	3,980
Loss (income) from equity method investees	112	(517)
Other	1,212	1,199
Changes in operating assets and liabilities before effects of business combinations and dispositions:		
Accounts receivable	(1,063)	(33,776)
Inventories	(2,191)	4,088
Derivative financial instruments	(19,985)	(2,386)
Prepaid expenses and other assets	2,911	175
Accounts payable and accrued liabilities	(30,283)	(35,007)
Current income taxes	(51)	(1,073)
Other	(1,065)	876
Net cash used in operating activities	(34,466)	(27,872)
Cash flows from investing activities:		
Purchases of property and equipment, net	(183,225)	(123,687)
Proceeds from the sale of assets	—	87,217
Proceeds from the sale of marketable securities	99,917	—
Other investing activities	(6,976)	(7,000)
Net cash used in investing activities	(90,284)	(43,470)
Cash flows from financing activities:		
Proceeds from the issuance of long-term debt	45,000	367,701
Payments of principal on long-term debt	(1,347)	(188,706)
Proceeds from short-term borrowings	1,649,828	2,450,416
Payments on short-term borrowings	(1,616,226)	(2,432,553)
Payments on extinguishment of convertible debt	(1,766)	(20,861)
Payments of cash distributions	(16,498)	(4,187)
Proceeds from issuance of common stock, net	—	356,011
Payments of loan fees	(2,522)	(9,050)
Payments related to tax withholdings for stock-based compensation	(3,806)	(4,674)
Other financing activities	(1,424)	3,330
Net cash provided by financing activities	51,239	517,427
Net change in cash, cash equivalents and restricted cash	(73,511)	446,085
Cash, cash equivalents and restricted cash, beginning of period	560,959	274,810
Cash, cash equivalents and restricted cash, end of period	$ 487,448	$ 720,895

Continued on the following page

GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS

(unaudited and in thousands)

Continued from the previous page

	Nine Months Ended September 30,	
	2022	**2021**
Reconciliation of total cash, cash equivalents and restricted cash:		
Cash and cash equivalents	$ 420,838	$ 589,822
Restricted cash	66,610	131,073
Total cash, cash equivalents and restricted cash	$ 487,448	$ 720,895
Non-cash financing activities:		
Exchange of 4.00% convertible notes due 2024 for shares of common stock held in treasury stock	$ 64,000	$ 51,000
Exchange of 4.125% convertible notes due 2022 for shares of common stock held in treasury stock	$ 32,550	$ —
Supplemental investing activities:		
Assets disposed of in sale	$ —	$ 54,626
Less: liabilities relinquished	—	(3,706)
Net assets disposed	$ —	$ 50,920
Supplemental disclosures of cash flow:		
Cash paid for income taxes, net	$ 381	$ 1,336
Cash paid for interest	$ 26,126	$ 25,529
Capital expenditures in accounts payable	$ 10,289	$ 12,207
Cash premium paid for extinguishment of convertible notes	$ —	$ 20,861

See accompanying notes to the consolidated financial statements.

GREEN PLAINS INC. AND SUBSIDIARIES

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(unaudited)

1. BASIS OF PRESENTATION, DESCRIPTION OF BUSINESS AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

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 September 30, 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 the 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 September 30, 2022 and December 31, 2021, excluding intercompany balances, are $95.4 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 September 30, 2022 and December 31, 2021, excluding intercompany balances, are $109.7 million and $111.4 million, respectively, which primarily consist of long-term debt as discussed in *Note 8 – Debt* and operating lease liabilities. The liabilities recognized as a result of consolidating the partnership do not represent additional claims on the company’s general assets.

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

The accompanying unaudited consolidated financial statements are prepared in accordance with GAAP for interim financial information and the instructions to Form 10-Q and Article 10 of Regulation S-X. Because they do not include all of the information and notes required by GAAP, the consolidated financial statements should be read in conjunction with the company’s annual report on Form 10-K for the year ended December 31, 2021, filed with the SEC on February 18, 2022.

The unaudited financial information reflects adjustments, which are, in the opinion of management, necessary for a fair presentation of results of operations, financial position and cash flows for the periods presented. The adjustments are normal and recurring in nature, unless otherwise noted. Interim period results are not necessarily indicative of the results to be expected for the entire year.

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. Key accounting policies, including but not limited to those relating to impairment of long-lived assets and goodwill, derivative financial instruments, and 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, including industrial-grade alcohol, distillers grains, Ultra-High Protein and 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, corn oil, natural gas and other commodities and (3) partnership, which includes fuel storage and transportation services.

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, 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 direct labor, materials, shipping and plant overhead costs. Direct labor includes all compensation and related benefits of non-management personnel involved in ethanol production. Grain purchasing and receiving costs, excluding labor costs for grain buyers and scale operators, are also included in cost of goods sold. 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 realized gains and losses on cash flow hedges from accumulated other comprehensive income or loss. Plant overhead consists primarily of plant utilities, repairs and maintenance and outbound freight charges. Shipping costs incurred by the company, including railcar costs, are also reflected in cost of goods sold.

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, corn oil, 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. 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.

The company evaluates its physical delivery contracts to determine if they qualify for normal purchase or sale exemptions which are expected to be used or sold over a reasonable period in the normal course of business. Contracts that do not meet the normal purchase or sale criteria are recorded at fair value. 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.

Recent Accounting Pronouncements

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 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.

2. REVENUE

Revenue by Source

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

	Three Months Ended September 30, 2022				
	Ethanol Production	**Agribusiness & Energy Services**	**Partnership**	**Eliminations**	**Total**
Revenues:					
Revenues from contracts with customers under ASC 606:					
Ethanol	$ —	$ —	$ —	$ —	$ —
Distillers grains	3,219	—	—	—	3,219
Corn oil	—	—	—	—	—
Service revenues	7,089	—	1,036	—	8,125
Other	258	2,211	—	—	2,469
Intersegment revenues	—	—	1,850	(1,850)	—
Total revenues from contracts with customers	10,566	2,211	2,886	(1,850)	13,813
Revenues from contracts accounted for as derivatives under ASC 815 (1):					
Ethanol	619,665	127,344	—	—	747,009
Distillers grains	123,892	11,330	—	—	135,222
Corn oil	47,668	—	—	—	47,668
Other	9,224	2,041	—	—	11,265
Intersegment revenues	—	6,836	—	(6,836)	—
Total revenues from contracts accounted for as derivatives	800,449	147,551	—	(6,836)	941,164
Leasing revenues under ASC 842 (2):	—	—	17,180	(17,180)	—
Total Revenues	$ 811,015	$ 149,762	$ 20,066	$ (25,866)	$ 954,977

	Nine Months Ended September 30, 2022				
	Ethanol Production	Agribusiness & Energy Services	Partnership	Eliminations	Total
Revenues:					
Revenues from contracts with customers under ASC 606:					
Ethanol	$ —	$ —	$ —	$ —	$ —
Distillers grains	19,982	—	—	—	19,982
Corn oil	—	—	—	—	—
Service revenues	12,376	—	2,953	—	15,329
Other	15,608	5,160	—	—	20,768
Intersegment revenues	—	234	5,788	(6,022)	—
Total revenues from contracts with customers	47,966	5,394	8,741	(6,022)	56,079
Revenues from contracts accounted for as derivatives under ASC 815 (1):					
Ethanol	1,736,228	361,036	—	—	2,097,264
Distillers grains	365,839	34,629	—	—	400,468
Corn oil	140,513	3,957	—	—	144,470
Other	19,188	31,337	—	—	50,525
Intersegment revenues	—	19,680	—	(19,680)	—
Total revenues from contracts accounted for as derivatives	2,261,768	450,639	—	(19,680)	2,692,727
Leasing revenues under ASC 842 (2):	—	—	50,079	(50,079)	—
Total Revenues	$ 2,309,734	$ 456,033	$ 58,820	$ (75,781)	$ 2,748,806

	Three Months Ended September 30, 2021				
	Ethanol Production	Agribusiness & Energy Services	Partnership	Eliminations	Total
Revenues:					
Revenues from contracts with customers under ASC 606:					
Ethanol	$ —	$ —	$ —	$ —	$ —
Distillers grains	6,936	—	—	—	6,936
Corn oil	—	—	—	—	—
Service revenues	520	—	1,019	—	1,539
Other	8,633	9,597	—	—	18,230
Intersegment revenues	—	—	1,969	(1,969)	—
Total revenues from contracts with customers	16,089	9,597	2,988	(1,969)	26,705
Revenues from contracts accounted for as derivatives under ASC 815 (1):					
Ethanol	455,843	109,552	—	—	565,395
Distillers grains	77,008	9,699	—	—	86,707
Corn oil	35,363	11,222	—	—	46,585
Grain	—	13,505	—	—	13,505
Other	4,046	3,837	—	—	7,883
Intersegment revenues	—	5,362	—	(5,362)	—
Total revenues from contracts accounted for as derivatives	572,260	153,177	—	(5,362)	720,075
Leasing revenues under ASC 842 (2):	—	—	16,263	(16,252)	11
Total Revenues	$ 588,349	$ 162,774	$ 19,251	$ (23,583)	$ 746,791

	Nine Months Ended September 30, 2021				
	Ethanol Production	Agribusiness & Energy Services	Partnership	Eliminations	Total
Revenues:					
Revenues from contracts with customers under ASC 606:					
Ethanol	$ —	$ —	$ —	$ —	$ —
Distillers grains	14,974	—	—	—	14,974
Corn oil	—	—	—	—	—
Service revenues	2,545	—	3,235	—	5,780
Other	25,062	12,640	—	—	37,702
Intersegment revenues	—	—	6,147	(6,147)	—
Total revenues from contracts with customers	42,581	12,640	9,382	(6,147)	58,456
Revenues from contracts accounted for as derivatives under ASC 815 (1):					
Ethanol	1,159,020	324,395	—	—	1,483,415
Distillers grains	268,167	27,953	—	—	296,120
Corn oil	75,252	23,808	—	—	99,060
Grain	—	36,473	—	—	36,473
Other	22,324	28,939	—	—	51,263
Intersegment revenues	—	15,997	—	(15,997)	—
Total revenues from contracts accounted for as derivatives	1,524,763	457,565	—	(15,997)	1,966,331
Leasing revenues under ASC 842 (2):	—	—	49,976	(49,914)	62
Total Revenues	$ 1,567,344	$ 470,205	$ 59,358	$ (72,058)	$ 2,024,849

(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 Customers

Revenues from Customer A represented 14% and 13% of total revenues for the three and nine months ended September 30, 2022, respectively, recorded within the ethanol production segment. No single customer's revenue was over 10% of total revenues for the three and nine months ended September 30, 2021.

3. DISPOSITION

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 during the nine months ended September 30, 2021.

4. 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 purchase and sale contracts in the agribusiness and energy services segment 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 September 30, 2022		
	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Total
Assets:			
Cash and cash equivalents	$ 420,838	$ —	$ 420,838
Restricted cash	66,610	—	66,610
Inventories carried at market	—	49,157	49,157
Derivative financial instruments - assets	—	24,156	24,156
Other assets	110	8	118
Total assets measured at fair value	$ 487,558	$ 73,321	$ 560,879
Liabilities:			
Accounts payable (1)	$ —	$ 14,168	$ 14,168
Accrued and other liabilities (2)	—	3,364	3,364
Derivative financial instruments - liabilities	—	24,337	24,337
Other liabilities (2)	—	6,877	6,877
Total liabilities measured at fair value	$ —	$ 48,746	$ 48,746

	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	$ 561,070	$ 99,066	$ 660,136
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	$ —	$ 49,782	$ 49,782

(1) Accounts payable is generally stated at historical amounts with the exception of $14.2 million and $12.6 million at September 30, 2022 and December 31, 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 September 30, 2022 and December 31, 2021, respectively, accrued and other liabilities includes $3.4 million and $3.3 million and other liabilities includes $6.8 million and $7.6 million of consideration related to potential earn-out payments recorded at fair value.

As of September 30, 2022, the fair value of the company's debt was approximately $711.0 million compared with a book value of $703.2 million. At December 31, 2021, the fair value of the company's debt was approximately $891.1 million compared with a book value of $722.7 million. The company estimated the fair value of its outstanding debt using Level 2 inputs. The company believes the fair values of its marketable securities approximated book value, which was $25.0 million and $124.9 million at September 30, 2022 and December 31, 2021, respectively. The company believes the fair values of its accounts receivable approximated book value, which was $118.4 million and $120.0 million at September 30, 2022 and December 31, 2021, respectively.

Although the company currently does not have any recurring Level 3 financial measurements, the fair values of tangible and intangible 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.

5. 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 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, 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 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):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Revenues:				
Ethanol production:				
Revenues from external customers	$ 811,015	$ 588,349	$ 2,309,734	$ 1,567,344
Intersegment revenues	—	—	—	—
Total segment revenues	811,015	588,349	2,309,734	1,567,344
Agribusiness and energy services:				
Revenues from external customers	142,926	157,412	436,119	454,208
Intersegment revenues	6,836	5,362	19,914	15,997
Total segment revenues	149,762	162,774	456,033	470,205
Partnership:				
Revenues from external customers	1,036	1,030	2,953	3,297
Intersegment revenues	19,030	18,221	55,867	56,061
Total segment revenues	20,066	19,251	58,820	59,358
Revenues including intersegment activity	980,843	770,374	2,824,587	2,096,907
Intersegment eliminations	(25,866)	(23,583)	(75,781)	(72,058)
	$ 954,977	$ 746,791	$ 2,748,806	$ 2,024,849

Refer to *Note 2 - Revenue*, for further disaggregation of revenue by operating segment.

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Cost of goods sold:				
Ethanol production	$ 843,843	$ 597,854	$ 2,310,224	$ 1,507,035
Agribusiness and energy services	139,922	154,427	418,017	440,682
Intersegment eliminations	(26,908)	(22,102)	(77,561)	(68,897)
	$ 956,857	$ 730,179	$ 2,650,680	$ 1,878,820

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Gross margin:				
Ethanol production	$ (32,828)	$ (9,505)	$ (490)	$ 60,309
Agribusiness and energy services	9,840	8,347	38,016	29,523
Partnership	20,066	19,251	58,820	59,358
Intersegment eliminations	1,042	(1,481)	1,780	(3,161)
	$ (1,880)	$ 16,612	$ 98,126	$ 146,029

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Operating income (loss):				
Ethanol production [1]	$ (64,121)	$ (44,192)	$ (87,773)	$ (30,969)
Agribusiness and energy services	5,205	3,225	25,894	15,720
Partnership	11,993	12,417	35,906	37,204
Intersegment eliminations	1,042	(1,481)	1,780	(3,161)
Corporate activities [2]	(15,999)	(14,644)	(51,748)	(1,089)
	$ (61,880)	$ (44,675)	$ (75,941)	$ 17,705

(1) Operating loss for ethanol production includes an inventory lower of cost or net realizable value adjustment of $11.2 million for the three and nine months ended September 30, 2022.
(2) Corporate activities for the three and nine months ended September 30, 2021 include a $1.8 million loss on sale of assets and a $31.2 million gain on sale of assets, respectively.

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Depreciation and amortization:				
Ethanol production	$ 21,555	$ 25,644	$ 59,101	$ 62,655
Agribusiness and energy services	1,280	870	2,214	2,072
Partnership	1,194	1,089	2,915	2,771
Corporate activities	618	677	1,783	1,995
	$ 24,647	$ 28,280	$ 66,013	$ 69,493

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

	September 30, 2022	December 31, 2021
Total assets [1]:		
Ethanol production	$ 1,172,799	$ 1,101,151
Agribusiness and energy services	429,624	487,164
Partnership	95,425	100,349
Corporate assets	411,843	524,206
Intersegment eliminations	(8,151)	(53,115)
	$ 2,101,540	$ 2,159,755

(1) Asset balances by segment exclude intercompany balances.

6. INVENTORIES

Inventories are carried at the lower of cost or net realizable value, except fair-value hedged inventories. As of September 30, 2022, the company recorded a $11.2 million lower of cost or net realizable value inventory adjustment associated with finished goods in cost of goods sold 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):

	September 30, 2022	December 31, 2021
Finished goods	$ 95,547	$ 91,448
Commodities held for sale	39,868	72,320
Raw materials	63,062	50,604
Work-in-process	21,671	19,783
Supplies and parts	38,704	33,683
	$ 258,852	$ 267,838

7. DERIVATIVE FINANCIAL INSTRUMENTS

At September 30, 2022, the company's consolidated balance sheet reflected unrealized losses of $10.8 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 (loss) 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' Fair Value		Liability Derivatives' Fair Value	
	September 30, 2022	December 31, 2021	September 30, 2022	December 31, 2021
Derivative financial instruments - forwards	$ 24,156 (1)	$ 26,738	$ 24,337 (2)	$ 26,117 (3)
Other assets	8	8	—	—
Other liabilities	—	—	38	196
Total	$ 24,164	$ 26,746	$ 24,375	$ 26,313

(1) At September 30, 2022, derivative financial instruments, as reflected on the balance sheet, includes net unrealized gains on exchange traded futures and options contracts of $7.2 million, which included $1.2 million of net unrealized losses on derivative financial instruments designated as cash flow hedging instruments, $7.1 million of unrealized gains on derivative financial instruments designated as fair value hedging instruments, and the balance representing economic hedges.

(2) At September 30, 2022, derivative financial instruments, as reflected on the balance sheet, includes net unrealized losses on exchange traded futures and options contracts of $1.5 million, 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 4 - 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: Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021
Revenues	$ 6,958	$ (691)	$ 5,219	$ (39,571)
Cost of goods sold	(4,760)	947	(3,748)	36,431
Net gain (loss) recognized in loss before income taxes	$ 2,198	$ 256	$ 1,471	$ (3,140)

Gain (Loss) Recognized in Other Comprehensive Income on Derivatives	Amount of Gain (Loss) Recognized in Other Comprehensive Income on Derivatives: Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021
Commodity contracts	$ 10,234	$ 709	$ 3,427	$ 1,080

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. 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: Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021
Exchange traded futures and options	Revenues	$ 1,302	$ (7,076)	$ 1,271	$ (63,612)
Forwards	Revenues	(4,775)	8,714	(508)	13,355
Exchange trade futures and options	Costs of goods sold	(13,455)	6,618	(53,663)	13,659
Forwards	Costs of goods sold	16,231	(14,212)	(2,066)	(9,699)
Net loss recognized in loss before income taxes		$ (697)	$ (5,956)	$ (54,966)	$ (46,297)

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

	September 30, 2022		December 31, 2021	
Line Item in the Consolidated Balance Sheet in Which the Hedged Item is Included	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	$ 49,157	$ (4,876)	$ 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 Three Months Ended September 30,			
	2022		2021	
	Revenue	Cost of Goods Sold	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	$ 6,958	$ (4,760)	$ (691)	$ 947
Gain (loss) on fair value hedging relationships:				
Commodity contracts:				
Fair-value hedged inventories	—	1,656	—	10,359
Exchange traded futures designated as hedging instruments	—	(4,262)	—	(10,726)
Total amounts of income and expense line items presented in the statement of operations in which the effects of cash flow or fair value hedges are recorded	$ 6,958	$ (7,366)	$ (691)	$ 580

	Location and Amount of Gain (Loss) Recognized in Income on Cash Flow and Fair Value Hedging Relationships for the Nine Months Ended September 30,			
	2022		2021	
	Revenue	Cost of Goods Sold	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	$ 5,219	$ (3,748)	$ (39,571)	$ 36,431
Gain (loss) on fair value hedging relationships:				
Commodity contracts:				
Fair-value hedged inventories	—	11,492	—	28,732
Exchange traded futures designated as hedging instruments	—	(8,973)	—	(25,078)
Total amounts of income and expense line items presented in the statement of operations in which the effects of cash flow or fair value hedges are recorded	$ 5,219	$ (1,229)	$ (39,571)	$ 40,085

There were no gains or losses from discontinuing cash flow or fair value hedge treatment during the three and nine months ended September 30, 2022 and 2021.

The notional volume of open commodity derivative positions as of September 30, 2022, are as follows (in thousands):

Derivative Instruments	Exchange Traded (1) Net Long & (Short)	Non-Exchange Traded (2) Long	Non-Exchange Traded (2) (Short)	Unit of Measure	Commodity
Futures	(20,605)			Bushels	Corn
Futures	15,105 (3)			Bushels	Corn
Futures	(1,290) (4)			Bushels	Corn
Futures	3,150			Gallons	Ethanol
Futures	(44,100) (3)			Gallons	Ethanol
Futures	(7,420)			MmBTU	Natural Gas
Futures	6,420 (3)			MmBTU	Natural Gas
Futures	(6,210) (4)			MmBTU	Natural Gas
Options	6,204			Pounds	Soybean Oil
Options	(56)			MmBTU	Natural Gas
Forwards		27,808	(18)	Bushels	Corn
Forwards		1,989	(241,680)	Gallons	Ethanol
Forwards		95	(361)	Tons	Distillers Grains
Forwards		—	(57,205)	Pounds	Corn Oil
Forwards		25,041	(516)	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.

8. DEBT

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

	September 30, 2022	December 31, 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)	75,000	30,000
Green Plains Partners:		
$60.0 million term loan (6) (7)	58,969	60,000
Other	15,147	15,531
Total book value of long-term debt	504,116	558,847
Unamortized debt issuance costs	(7,012)	(9,556)
Less: current maturities of long-term debt	(1,835)	(35,285)
Total long-term debt	$ 495,269	$ 514,006

(1) Includes $5.6 million and $6.5 million of unamortized debt issuance costs as of September 30, 2022 and December 31, 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 September 30, 2022 and December 31, 2021, respectively.
(5) Includes $0.3 million of unamortized debt issuance costs as of both September 30, 2022 and December 31, 2021, respectively.
(6) Includes $0.5 million of unamortized debt issuance costs as of both September 30, 2022 and December 31, 2021, respectively.
(7) On February 11, 2022, the term 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 components of short-term notes payable and other borrowings are as follows (in thousands):

	September 30, 2022	December 31, 2021
Green Plains Finance Company, Green Plains Grain and Green Plains Trade:		
$350.0 million revolver	$ 195,000	$ —
Green Plains Commodity Management:		
$40.0 million hedge line	11,102	16,210
Green Plains Trade:		
$300.0 million revolver	—	137,208
Green Plains Grain:		
$100.0 million revolver	—	20,000
	$ 206,102	$ 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; the event of a cash dividend or distribution; 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 is 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, 3,568,705 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 three months ended June 30, 2021, of which $1.2 million 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 is 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. 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 three months ended September 30, 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.

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 greenhouse gas emissions, recordable incident rate reduction, increased 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.

Green Plains Commodity Management has an uncommitted $40.0 million revolving credit facility which matures April 30, 2023, to finance margins related to its hedging programs. Advances are subject to variable interest rates equal to SOFR plus 1.75%. The company had $11.1 million short-term notes payable related to this credit facility as of September 30, 2022.

Green Plains Grain has a short-term inventory financing agreement with a financial institution. The company has accounted for the agreement 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 September 30, 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 are being used to construct MSC™ protein technology 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 September 30, 2022.

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 MSC™ protein 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 commencing on June 30, 2021, 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.

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

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 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 term 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 than 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.

Covenant Compliance

The company was in compliance with its debt covenants as of September 30, 2022.

Restricted Net Assets

At September 30, 2022, there were approximately $115.4 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.

9. STOCK-BASED COMPENSATION

The company has an equity incentive plan which reserved a total of 5.7 million shares of common stock for issuance pursuant to the plan, of which 1.6 million shares remain outstanding and available. 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, restricted and deferred stock unit awards and performance share awards 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.

Restricted Stock Awards and Deferred Stock Units

The non-vested stock award and deferred stock unit activity for the nine months ended September 30, 2022, is 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	290,471	30.16	
Forfeited	(6,547)	20.23	
Vested	(276,856)	15.79	
Non-Vested at September 30, 2022	800,405	$ 19.83	2.0

Performance Shares

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 various metrics including but not limited to the company's high-protein initiatives, annual production levels and return on investment (ROI). The performance shares were granted at a target of 100%, but each performance share can be reduced or increased 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 each 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 149,933 2019 performance shares vested at 75%, which resulted in the issuance of 112,450 shares of common stock.

The non-vested performance share award activity for the nine months ended September 30, 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	
Vested	(149,933)	15.31	
Non-Vested at September 30, 2022	482,811	$ 18.22	2.1

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 nine months ended September 30, 2022, is 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 September 30, 2022	19,707	$ 12.18	0.8

Stock-Based and Unit Based Compensation Expense

Compensation costs for stock-based and unit-based payment plans were $2.4 million and $6.6 million for the three and nine months ended September 30, 2022, respectively, and $2.0 million and $4.0 million for the three and nine months ended September 30, 2021, respectively. At September 30, 2022, there was $15.6 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 2.0 years. The potential tax benefit related to stock-based payment is approximately 19.1% of these expenses.

10. 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 computed 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):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
EPS - basic and diluted:				
Net loss attributable to Green Plains	$ (73,526)	$ (59,622)	$ (88,602)	$ (56,424)
Weighted average shares outstanding - basic and diluted	57,677	50,482	54,550	44,581
EPS - basic and diluted	$ (1.27)	$ (1.18)	$ (1.62)	$ (1.27)
Anti-dilutive weighted-average convertible debt, warrants and stock-based compensation [(1)]	8,660	14,055	8,571	12,458

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

11. STOCKHOLDERS' EQUITY

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, and are treated as equity based awards and recorded as a reduction in additional paid-in capital. The remaining 275,000 warrants, of which 83,333 are exercisable as a result of achieving certain earn-out provisions and 191,667 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 completed 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 3,568,705 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.

Components of stockholders' equity for the three and nine months ended September 30, 2022 and 2021 are as follows (in thousands):

	Common Stock		Additional Paid-in Capital	Retained Earnings (Deficit)	Accum. Other Comp. Income (Loss)	Treasury Stock		Total Green Plains Stockholders' Equity	Non-Controlling Interests	Total Stockholders' Equity
	Shares	Amount				Shares	Amount			
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)	—	—	—	(61,474)	—	—	—	(61,474)	5,602	(55,872)
Distributions declared	—	—	—	—	—	—	—	—	(5,122)	(5,122)
Other comprehensive income (loss) before reclassification	—	—	—	—	5,386	—	—	5,386	—	5,386
Amounts reclassified from accumulated other comprehensive income (loss)	—	—	—	—	(1,965)	—	—	(1,965)	—	(1,965)
Other comprehensive income (loss), net of tax	—	—	—	—	3,421	—	—	3,421	—	3,421
Investment in subsidiary	—	—	—	—	—	—	—	—	24	24
Stock-based compensation	226	—	(1,922)	—	—	—	—	(1,922)	59	(1,863)
Balance, March 31, 2022	62,066	62	1,067,651	(76,673)	(8,889)	8,244	(91,626)	890,525	152,082	1,042,607
Net income	—	—	—	46,398	—	—	—	46,398	6,322	52,720
Distributions declared	—	—	—	—	—	—	—	—	(8,098)	(8,098)
Other comprehensive income (loss) before reclassification	—	—	—	—	(10,535)	—	—	(10,535)	—	(10,535)
Amounts reclassified from accumulated other comprehensive income (loss)	—	—	—	—	2,515	—	—	2,515	—	2,515
Other comprehensive income (loss), net of tax	—	—	—	—	(8,020)	—	—	(8,020)	—	(8,020)
Investment in subsidiary	—	—	—	—	—	—	—	—	190	190
Stock-based compensation	21	—	2,270	—	—	—	—	2,270	60	2,330
Balance, June 30, 2022	62,087	62	1,069,921	(30,275)	(16,909)	8,244	(91,626)	931,173	150,556	1,081,729
Net income (loss)	—	—	—	(73,526)	—	—	—	(73,526)	5,623	(67,903)
Distributions declared	—	—	—	—	—	—	—	—	(5,247)	(5,247)
Other comprehensive income (loss) before reclassification	—	—	—	—	7,740	—	—	7,740	—	7,740
Amounts reclassified from accumulated other comprehensive income (loss)	—	—	—	—	(1,662)	—	—	(1,662)	—	(1,662)
Other comprehensive income (loss), net of tax	—	—	—	—	6,078	—	—	6,078	—	6,078
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 subsidiary	—	—	—	—	—	—	—	—	199	199
Stock-based compensation	1	—	2,312	—	—	—	—	2,312	61	2,373
Balance, September 30, 2022	62,088	$ 62	$ 1,107,786	$ (103,801)	$ (10,831)	2,805	$ (31,174)	$ 962,042	$ 151,192	$ 1,113,234

	Common Stock		Additional Paid-in Capital	Retained Earnings (Deficit)	Accum. Other Comp. Income (Loss)	Treasury Stock		Total Green Plains Stockholders' Equity	Non-Controlling Interests	Total Stockholders' Equity
	Shares	Amount				Shares	Amount			
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)	—	—	—	(6,545)	—	—	—	(6,545)	4,566	(1,979)
Distributions declared	—	—	—	—	—	—	—	—	(1,395)	(1,395)
Other comprehensive income (loss) before reclassification	—	—	—	—	(4,849)	—	—	(4,849)	—	(4,849)
Amounts reclassified from accumulated other comprehensive income (loss)	—	—	—	—	(1,377)	—	—	(1,377)	—	(1,377)
Other comprehensive income (loss), net of tax	—	—	—	—	(6,226)	—	—	(6,226)	—	(6,226)
Investment in subsidiary	—	—	—	—	—	—	—	—	3,330	3,330
Issuance of warrants	—	—	3,431	—	—	—	—	3,431	(3,431)	—
Issuance of common stock for cash at $23.00 per share, net of fees	8,752	9	191,125	—	—	—	—	191,134	—	191,134
Stock-based compensation	230	—	(3,000)	—	—	—	—	(3,000)	79	(2,921)
Balance, March 31, 2021	56,453	56	882,949	44,248	(8,398)	11,813	(131,287)	787,568	132,961	920,529
Net income (loss)	—	—	—	9,743	—	—	—	9,743	6,374	16,117
Distributions declared	—	—	—	—	—	—	—	—	(1,395)	(1,395)
Other comprehensive income (loss) before reclassification	—	—	—	—	5,131	—	—	5,131	—	5,131
Amounts reclassified from accumulated other comprehensive income (loss)	—	—	—	—	3,961	—	—	3,961	—	3,961
Other comprehensive income (loss), net of tax	—	—	—	—	9,092	—	—	9,092	—	9,092
Exchange of 4.00% convertible notes due 2024	—	—	17,679	—	—	(3,569)	39,661	57,340	—	57,340
Investment in subsidiary	—	—	—	—	—	—	—	—	3,139	3,139
Stock-based compensation	(20)	4	324	—	—	—	—	328	80	408
Balance, June 30, 2021	56,433	60	900,952	53,991	694	8,244	(91,626)	864,071	141,159	1,005,230
Net income (loss)	—	—	—	(59,622)	—	—	—	(59,622)	5,211	(54,411)
Distributions declared	—	—	—	—	—	—	—	—	(1,397)	(1,397)
Other comprehensive income (loss) before reclassification	—	—	—	—	538	—	—	538	—	538
Amounts reclassified from accumulated other comprehensive income (loss)	—	—	—	—	(194)	—	—	(194)	—	(194)
Other comprehensive income (loss), net of tax	—	—	—	—	344	—	—	344	—	344
Investment in subsidiary	—	—	—	—	—	—	—	—	1,156	1,156
Issuance of common stock for cash at $32.00 per share, net of fees	5,463	5	164,872	—	—	—	—	164,877	—	164,877
Stock-based compensation	(57)	—	1,759	—	—	—	—	1,759	60	1,819
Balance, September 30, 2021	61,839	$ 65	$ 1,067,583	$ (5,631)	$ 1,038	8,244	$ (91,626)	$ 971,429	$ 146,189	$ 1,117,618

Amounts reclassified from accumulated other comprehensive income are as follows (in thousands):

	Three Months Ended September 30,		Nine Months Ended September 30,		Statements of Operations Classification
	2022	2021	2022	2021	
Gains (losses) on cash flow hedges:					
Commodity derivatives	$ 6,958	$ (691)	$ 5,219	$ (39,571)	(1)
Commodity derivatives	(4,760)	947	(3,748)	36,431	(2)
Total gains (losses) on cash flow hedges	2,198	256	1,471	(3,140)	(3)
Income tax benefit (expense)	(536)	(62)	(359)	750	(4)
Amounts reclassified from accumulated other comprehensive income (loss)	$ 1,662	$ 194	$ 1,112	$ (2,390)	

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

12. INCOME TAXES

The company records actual income tax expense or benefit during interim periods rather than on an annual effective tax rate method. Certain items are given discrete period treatment and the tax effect of those items are reported in full in the relevant interim period. 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 income taxes on pre-tax income or loss attributable to the noncontrolling interest in the partnership.

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.

The company recorded income tax benefit of $1.9 million for the three months ended September 30, 2022, compared with income tax expense of $7 thousand for the same period in 2021. The increase in the amount of tax benefit recorded for the three months ended September 30, 2022 was primarily due to a decrease in the valuation allowance recorded against deferred tax assets related to gains (losses) on derivatives included in accumulated other comprehensive income.

The effective tax rate can be affected by variances in the estimates and amounts of taxable income among the various states, entities and activity types, realization of tax credits, adjustments from resolution of tax matters under review, valuation allowances and the company’s assessment of its liability for uncertain tax positions.

13. 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 approximately 15.1 years. The land and facility leases include renewal options. The renewal options are included in the lease term only for those sites or locations that 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):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Lease expense				
Operating lease expense	$ 5,220	$ 4,803	$ 15,608	$ 14,645
Variable lease expense [1]	776	301	1,181	892
Total lease expense	$ 5,996	$ 5,104	$ 16,789	$ 15,537

(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):

	Three Months Ended September 30,		Nine Months Ended September 30,	
	2022	2021	2022	2021
Cash paid for amounts included in the measurement of lease liabilities:				
Operating cash flows from operating leases	$ 4,949	$ 4,706	$ 14,823	$ 14,352
Right-of-use assets obtained in exchange for lease obligations:				
Operating leases	1,428	7,162	13,151	17,934
Right-of-use assets and lease obligations derecognized due to lease modifications:				
Operating leases	—	1,838	—	1,889

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

	September 30, 2022	December 31, 2021
Weighted average remaining lease term	5.2 years	5.5 years
Weighted average discount rate	4.12 %	4.16 %

Aggregate minimum lease payments under the operating lease agreements for the remainder of 2022 and in future years are as follows (in thousands):

Year Ending December 31,	Amount
2022	$ 5,529
2023	19,424
2024	16,888
2025	12,327
2026	6,117
Thereafter	14,839
Total	75,124
Less: Present value discount	(8,390)
Lease liabilities	$ 66,734

Lease Revenue

As described in Note 2 – *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 is eliminated upon consolidation. The remaining lease revenue is not material to the company.

Commodities, Storage and Transportation

As of September 30, 2022, the company had contracted future purchases of ethanol, grain, natural gas, and distillers grains, valued at approximately $366.0 million and future commitments for storage and transportation, valued at approximately $27.8 million.

Government Assistance

During the nine months ended September 30, 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 during 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.

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations.

General

The following discussion and analysis provides information we believe is relevant to understand our consolidated financial condition and results of operations. This discussion should be read in conjunction with the consolidated financial statements and notes to the consolidated financial statements contained in this report together with our annual report on Form 10-K for the year ended December 31, 2021.

Cautionary Information Regarding Forward-Looking Statements

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 that 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 may be identified by words such as "anticipate," "believe," "continue," "estimate," "expect," "intend," "outlook," "plan," "predict," "may," "could," "should," "will" and similar expressions, 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 in the forward-looking statements include, but are not limited to, those discussed in Part I, Item 1A – Risk Factors of our annual report on Form 10-K for the year ended December 31, 2021, Part II, Item 1A – Risk Factors in this report, or incorporated by reference. Specifically, we may experience fluctuations in future operating results due to a number of economic conditions, including: disruption caused by health epidemics, such as the COVID-19 outbreak; 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 acquisition and disposition activities and achieving anticipated results; risks associated with merchant trading; risks related to our equity method investees 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.

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 ag-tech innovator. We continue the transition from a commodity-processing business to a value-added agricultural technology company creating sustainable, high-value ingredients. In addition, we are currently undergoing a number of project initiatives to generate higher non-cyclical margins. We believe we can further increase margins by producing additional value-added ingredients, such as Ultra-High Protein, dextrose and more.

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 operating margins through our business segments and risk management strategy.

We formed Green Plains Partners LP, a master limited partnership, to be our primary downstream storage and logistics provider since its assets are the principal method of storing and delivering the ethanol we produce. The partnership completed its initial public offering on July 1, 2015. As of September 30, 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, including industrial-grade alcohol, distillers grains, Ultra-High Protein and corn oil at 11 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 1 billion gallons of ethanol, 2.5 million tons of distillers grains and Ultra-High Protein and 290 million pounds of industrial grade corn oil, making us one of the largest ethanol producers in North America.

- *Agribusiness and Energy Services.* Our agribusiness and energy services segment includes grain procurement, with approximately 27 million bushels of grain storage capacity, and our commodity marketing business, which markets, sells and distributes ethanol, distillers grains, Ultra-High Protein and corn oil produced at our ethanol plants. We also market ethanol for a third-party producer as well as buy and sell ethanol, including industrial-grade alcohol, distillers grains, Ultra-High Protein, corn oil, grain, natural gas and other commodities in various markets.

- *Partnership.* Our master limited partnership 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. The partnership's assets include 29 ethanol storage facilities, two fuel terminal facilities and approximately 2,500 leased railcars.

As part of our transformation to a value-add agricultural technology company, we completed our first MSC™ installation at our Shenandoah, Iowa, biorefinery during the first quarter of 2020. Our Wood River, Nebraska, plant began MSC™ operations in October 2021. Commissioning on our MSC™ installation at our Central City plant began during the third quarter with two additional locations slated to begin commissioning in the fourth quarter of 2022. Installation at certain of our remaining 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-MSC distillers grains.

We have also upgraded our York facility to include USP grade alcohol capabilities. 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 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 greenhouse gas emissions through the capture of carbon dioxide at each of the biorefineries, significantly lowering their carbon intensity. According to Summit Carbon Solutions, the anticipated completion date for this project is 2024.

Our profitability is highly dependent on commodity prices, particularly for ethanol, industrial alcohol, distillers grains, 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.

Recent Developments

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 notes were converted into approximately 4.3 million shares of common stock. All $64.0 million were retired effective July 8, 2022.

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, 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. 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.

Results of Operations

During the third quarter of 2022, we experienced a weak ethanol margin environment due in part to historically high physical corn basis levels across our entire platform. We maintained an average utilization rate of approximately 90.9% of capacity, resulting in ethanol production of 219.4 mmg for the third quarter of 2022, compared with 181.2 mmg, or 75.0% of capacity, for the same quarter last year. The increase in the average utilization rate was primarily due to completing our plant modernization and upgrade program earlier this 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 minimum volume commitments made to the partnership in the future, depending on various factors that drive each biorefineries 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 two locations, commissioned a third plant in the third quarter, and are deploying FQT MSC™ technology at two additional locations, which we expect to be commissioned in the fourth quarter of 2022. We are deploying the FQT MSC™ technology at select locations across our platform to help meet growing global demand for protein feed ingredients and low-carbon renewable corn oil.

U.S. Ethanol Supply and Demand

According to the EIA, domestic ethanol production averaged 979 thousand barrels per day during the third quarter of 2022, which was 0.5% higher than the 974 thousand barrels per day for the same quarter last year. Refiner and blender input volume was 902 thousand barrels per day for the third quarter of 2022, compared with 919 thousand barrels per day for the same quarter last year. Gasoline demand decreased 0.6 million barrels per day, or 6.6% during the third quarter of 2022 compared to the prior year. U.S. domestic ethanol ending stocks increased by approximately 1.5 million barrels compared to the prior year, or 7.2%, to 21.7 million barrels as of September 30, 2022. As of this filing, according to Prime the Pump, there were approximately 2,743 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 August 31, 2022, were approximately 1,012 mmg, up from the 796 mmg for the same period of 2021. Canada was the largest export destination for U.S. ethanol accounting for 32% of domestic ethanol export volume, driven in part by their national clean fuel standard. South Korea, India, and the Netherlands accounted for 13%, 8%, and 7%, respectively, of U.S. ethanol exports. We currently estimate that net ethanol exports will range from 1.3 to 1.5 billion gallons in 2022, based on historical demand from a variety of countries and certain countries that seek to improve their air quality, reduce green house 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.

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 fuels 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 (a) created a new Clean Fuel Production Credit, section 45Z of the Internal Revenue Code, which runs from 2025 to 2027 of up to $1.00 per gallon, which could impact our fuel ethanol, depending on the level of green house gas reduction for each gallon; (b) created a new tax credit for sustainable aviation fuel of $1.25 to $1.75 per gallon, depending on the green house gas reduction for each gallon, that could possibly involve some of our low carbon ethanol through an alcohol to jet pathway, depending on the life cycle analysis model being used (this credit expires after 2024 and shifts to the Clean Fuel Production Credit, where it qualifies for up to $1.75 per gallon); (c) expanded the carbon capture and sequestration credit, section 45Q, to $85 for each ton of carbon sequestered, which could impact our carbon capture partnership and other potential carbon capture investments; (d) 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; (e) funded biofuel refueling infrastructure, which could impact the availability of higher level ethanol blended fuel; (f) increased funding for working lands conservation programs for farmers by $20 billion; and (g) 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.

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 this filing, the EPA has finalized RVOs reducing the conventional ethanol levels for 2020 and 2021 to reflect lower fuel demand during the pandemic, and finalized an RVO at the statutory 15 billion gallons for 2022, with an additional 250 million gallons of supplemental volume to reflect a court-ordered remand of a previously-lowered RVO. The EPA has agreed to consent decree from the U.S. District Court for D.C. to propose an RVO for 2023 (and possibly 2024 and 2025) by November 16, 2022, and finalize the rule by June 14, 2023. It is possible the expand the types of fuels that can qualify for credits under the RFS, including the so-called e-RINs for electric vehicles.

According to the RFS, if mandatory renewable fuel volumes are reduced by at least 20% for two consecutive years, the EPA is required to modify, or reset, statutory volumes through 2022, the year through which the statutorily prescribed volumes run. While conventional ethanol maintained 15 billion gallons, 2019 was the second consecutive year that the total RVO was more than 20% below the statutory volume levels. Thus, the EPA was expected to initiate a reset rulemaking, and modify statutory volumes through 2022, and do so based on the same factors they are to use in setting the RVOs post 2022. These factors include environmental impact, domestic energy security, expected production, infrastructure impact, consumer costs, job creation, price of agricultural commodities, food prices, and rural economic development. However, in late 2019, the EPA announced it would not be moving forward with a reset rulemaking in 2020. The current EPA has indicated they will not propose a reset rulemaking, though they have stated an intention to propose a post-2022 set rulemaking by November 16, 2022, and finalize by June 14, 2023, in compliance with a consent decree from the U.S. District Court for D.C.

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. Obligated parties use RINs to show compliance with the RFS mandated volumes. Ethanol producers assign a RIN 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 affects the price of ethanol in certain markets and can influence purchasing decisions by obligated parties.

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 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 Trump Administration, erasing a total of 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. There are multiple 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 2,743 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 they would administer another infrastructure grant program. The recently enacted Inflation Reduction Act provided for an additional $500 million in USDA grants for biofuel infrastructure from 2022 to 2031.

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.

Comparability of our Financial Results

As of September 30, 2022, we, together with our subsidiaries, own a 48.8% limited partner interest and a 2.0% general partner interest in the partnership and own all of the partnership's incentive distribution rights, with the remaining 49.2% limited partner interest owned by public common unitholders. We consolidate the financial results of the partnership, and record a noncontrolling interest for the economic interest in the partnership held by the public common unitholders.

There are various events that affect comparability of our operating results from 2022 to 2021, including ethanol production rates and the disposition of our Ord, Nebraska plant in March 2021.

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 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 and the loss (gain) on sale of assets. When we evaluate segment performance, we review the following segment information as well as earnings before interest, income taxes, depreciation and amortization, or EBITDA, and adjusted EBITDA.

Segment Results

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

	Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	% Variance	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021	% Variance
Revenues:						
Ethanol production:						
Revenues from external customers	$ 811,015	$ 588,349	37.8%	$ 2,309,734	$ 1,567,344	47.4%
Intersegment revenues	—	—	*	—	—	*
Total segment revenues	811,015	588,349	37.8	2,309,734	1,567,344	47.4
Agribusiness and energy services:						
Revenues from external customers	142,926	157,412	(9.2)	436,119	454,208	(4.0)
Intersegment revenues	6,836	5,362	27.5	19,914	15,997	24.5
Total segment revenues	149,762	162,774	(8.0)	456,033	470,205	(3.0)
Partnership:						
Revenues from external customers	1,036	1,030	0.6	2,953	3,297	(10.4)
Intersegment revenues	19,030	18,221	4.4	55,867	56,061	(0.3)
Total segment revenues	20,066	19,251	4.2	58,820	59,358	(0.9)
Revenues including intersegment activity	980,843	770,374	27.3	2,824,587	2,096,907	34.7
Intersegment eliminations	(25,866)	(23,583)	9.7	(75,781)	(72,058)	5.2
	$ 954,977	$ 746,791	27.9%	$ 2,748,806	$ 2,024,849	35.8%

	Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	% Variance	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021	% Variance
Cost of goods sold:						
Ethanol production	$ 843,843	$ 597,854	41.1%	$ 2,310,224	$ 1,507,035	53.3%
Agribusiness and energy services	139,922	154,427	(9.4)	418,017	440,682	(5.1)
Intersegment eliminations	(26,908)	(22,102)	21.7	(77,561)	(68,897)	12.6
	$ 956,857	$ 730,179	31.0%	$ 2,650,680	$ 1,878,820	41.1%

	Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	% Variance	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021	% Variance
Gross margin:						
Ethanol production	$ (32,828)	$ (9,505)	245.4%	$ (490)	$ 60,309	(100.8)%
Agribusiness and energy services	9,840	8,347	17.9	38,016	29,523	28.8
Partnership	20,066	19,251	4.2	58,820	59,358	(0.9)
Intersegment eliminations	1,042	(1,481)	170.4	1,780	(3,161)	156.3
	$ (1,880)	$ 16,612	(111.3)%	$ 98,126	$ 146,029	(32.8)%

	Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	% Variance	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021	% Variance
Operating income (loss):						
Ethanol production (1)	$ (64,121)	$ (44,192)	45.1%	$ (87,773)	$ (30,969)	183.4%
Agribusiness and energy services	5,205	3,225	61.4	25,894	15,720	64.7
Partnership	11,993	12,417	(3.4)	35,906	37,204	(3.5)
Intersegment eliminations	1,042	(1,481)	170.4	1,780	(3,161)	156.3
Corporate activities (2)	(15,999)	(14,644)	9.3	(51,748)	(1,089)	*
	$ (61,880)	$ (44,675)	38.5%	$ (75,941)	$ 17,705	*

(1) Operating loss for ethanol production includes an inventory lower of cost or net realizable value adjustment of $11.2 million for the three and nine months ended September 30, 2022.
(2) Corporate activities for the three and nine months ended September 30, 2021, includes a $1.8 million loss on sale of assets and a $31.2 million gain on sale of assets, respectively.

	Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	% Variance	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021	% Variance
Depreciation and amortization:						
Ethanol production	$ 21,555	$ 25,644	(15.9 %)	$ 59,101	$ 62,655	(5.7 %)
Agribusiness and energy services	1,280	870	47.1	2,214	2,072	6.9
Partnership	1,194	1,089	9.6	2,915	2,771	5.2
Corporate activities	618	677	(8.7)	1,783	1,995	(10.6)
	$ 24,647	$ 28,280	(12.8 %)	$ 66,013	$ 69,493	(5.0 %)

* Percentage variance not considered meaningful.

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, depreciation and amortization excluding the amortization of right-of-use assets and debt issuance costs. Adjusted EBITDA includes adjustments related to gains or losses on sale of assets, other income associated with the USDA COVID-19 relief grant, and our proportional share of EBITDA adjustments of our equity method investees. 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):

	Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021
Net loss	$ (67,903)	$ (54,411)	$ (71,055)	$ (40,273)
Interest expense [1]	9,576	9,488	26,182	60,225
Income tax expense (benefit)	(1,888)	7	(146)	(2,914)
Depreciation and amortization [2]	24,647	28,280	66,013	69,493
EBITDA	(35,568)	(16,636)	20,994	86,531
Other income [3]	—	—	(27,712)	—
Loss (gain) on sale of assets, net	—	1,823	—	(31,245)
Proportional share of EBITDA adjustments to equity method investees	45	45	135	139
Adjusted EBITDA	$ (35,523)	$ (14,768)	$ (6,583)	$ 55,425

(1) Interest expense for three and nine months ended September 30, 2022, includes a loss on settlement of convertible notes of $419 thousand, and for the nine months ended September 30, 2021, includes a loss upon extinguishment of convertible notes of $22.1 million and a loss on settlement of convertible notes of $9.5 million.
(2) Excludes amortization of operating lease right-of-use assets and amortization of debt issuance costs.
(3) Other income for the nine months ended September 30, 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):

	Three Months Ended September 30, 2022	Three Months Ended September 30, 2021	% Variance	Nine Months Ended September 30, 2022	Nine Months Ended September 30, 2021	% Variance
Adjusted EBITDA:						
Ethanol production [1]	$ (42,471)	$ (18,524)	129.3%	$ (517)	$ 31,739	(101.6)%
Agribusiness and energy services	6,536	3,818	71.2	28,009	17,515	59.9
Partnership	13,270	13,679	(3.0)	39,275	40,492	(3.0)
Intersegment eliminations	1,042	(1,480)	170.4	1,780	(3,160)	156.3
Corporate activities [2]	(13,945)	(14,129)	(1.3)	(47,553)	(55)	*
EBITDA	(35,568)	(16,636)	113.8	20,994	86,531	(75.7)
Other income [3]	—	—	*	(27,712)	—	*
Loss (gain) on sale of assets, net	—	1,823	*	—	(31,245)	*
Proportional share of EBITDA adjustments to equity method investees	45	45	—	135	139	(2.9)
	$ (35,523)	$ (14,768)	140.5%	$ (6,583)	$ 55,425	(111.9)%

(1) Operating loss for ethanol production includes an inventory lower of cost or net realizable value adjustment of $11.2 million for the three and nine months ended September 30, 2022.
(2) Includes corporate expenses, offset by a loss on sale of assets of $1.8 million and a $31.2 million gain on sale of assets for the three and nine months ended September 30, 2021, respectively.
(3) Other income for the nine months ended September 30, 2022 includes a grant received from the USDA related to the Biofuel Producer Program of $27.7 million.

* Percentage variance not considered meaningful.

Three Months Ended September 30, 2022 Compared with the Three Months Ended September 30, 2021

Consolidated Results

Consolidated revenues increased $208.2 million for the three months ended September 30, 2022 compared with the same period in 2021 primarily due to higher average prices and higher volumes sold on ethanol, distillers grains, and corn oil.

Net loss increased $13.5 million and adjusted EBITDA decreased $20.8 million for the three months ended September 30, 2022, compared with the same period last year primarily due to lower ethanol crush margins, offset by the $27.7 million USDA COVID-19 relief grant received, which is excluded from adjusted EBITDA, and also higher margins on agribusiness and energy services. Interest expense increased $0.1 million for the three months ended September 30, 2022, compared with the same period in 2021. Income tax benefit was $1.9 million for the three months ended September 30, 2022, compared with income tax expense of $7 thousand for the same period in 2021 primarily due to a decrease in the valuation allowance recorded against deferred tax assets included in AOCI for the three months ended September 30, 2022.

The following discussion provides greater detail about our third quarter segment performance.

Ethanol Production Segment

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

	Three Months Ended September 30,		
	2022	**2021**	**% Variance**
Ethanol sold (thousands of gallons)	219,166	181,214	20.9%
Distillers grains sold (thousands of equivalent dried tons)	586	492	19.1
Corn oil sold (thousands of pounds)	72,975	55,397	31.7
Corn consumed (thousands of bushels)	75,308	62,524	20.4%

Revenues in our ethanol production segment increased $222.7 million for the three months ended September 30, 2022 compared with the same period in 2021, primarily due to higher ethanol, distillers grains and corn oil volumes sold resulting in increased revenues of $95.7 million, $16.5 million and $11.2 million, respectively, as well as higher weighted average selling prices on ethanol and distillers grains resulting in increased revenues of $60.4 million and $29.5 million, respectively. Revenues also increased as a result of hedging activities by $5.0 million.

Cost of goods sold in our ethanol production segment increased $246.0 million for the three months ended September 30, 2022 compared with the same period last year primarily due to higher corn volumes processed, higher weighted average corn prices and hedging activities, resulting in increased costs of $87.6 million, $60.6 million and $19.4 million, respectively, with the remainder of the increase primarily driven by higher utilities, freight and chemical costs.

Operating loss in our ethanol production segment increased $19.9 million for the three months ended September 30, 2022 compared with the same period in 2021 primarily due to decreased margins as outlined above. Depreciation and amortization expense for the ethanol production segment was $21.6 million for the three months ended September 30, 2022, compared with $25.6 million for the same period last year.

Agribusiness and Energy Services Segment

Revenues in our agribusiness and energy services segment decreased $13.0 million while operating income increased $2.0 million for the three months ended September 30, 2022, compared with the same period in 2021. The decrease in revenues was primarily due to a decrease in ethanol and corn oil trading volume. Operating income increased primarily as a result of higher trading margins.

Partnership Segment

Revenues generated by our partnership segment increased $0.8 million for the three months ended September 30, 2022 compared with the same period for 2021. Storage and throughput services revenue was consistent with the prior year. Railcar transportation services revenue increased $0.9 million primarily due to an increase in capacity provided. Terminal services revenue decreased $0.1 million due to slightly lower throughput volumes compared to the prior year. Trucking and other revenue was consistent with the prior year. Operating income decreased $0.4 million for the three months ended September 30, 2022 compared with the same period in 2021.

Intersegment Eliminations

Intersegment eliminations of revenues increased by $2.3 million for the three months ended September 30, 2022, compared with the same period in 2021 primarily due to increased intersegment marketing and services 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 $1.4 million for the three months ended September 30, 2022, compared to the same period in 2021, primarily due to increased personnel costs during the three months ended September 30, 2022.

Income Taxes

We recorded income tax benefit of $1.9 million for the three months ended September 30, 2022, compared with income tax expense of $7 thousand for the same period in 2021. The increase in the amount of tax benefit recorded for the three months ended September 30, 2022 was primarily due to a decrease in the valuation allowance recorded against deferred tax assets included in AOCI.

Nine Months Ended September 30, 2022 Compared with the Nine Months Ended September 30, 2021

Consolidated Results

Consolidated revenues increased $724.0 million for the nine months ended September 30, 2022, compared with the same period in 2021 primarily due to higher average prices and higher sales volumes on ethanol, distillers grains and corn oil.

Net loss increased $30.8 million and adjusted EBITDA decreased $62.0 million for the nine months ended September 30, 2022 compared with the same period last year primarily due to decreased margins on ethanol production. Interest expense decreased $34.0 million for the nine months ended September 30, 2022 compared with the same period in 2021 primarily due to the loss upon extinguishment of convertible notes of $31.6 million for the nine months ended September 30, 2021. Income tax benefit was $0.1 million for the nine months ended September 30, 2022, compared with income tax benefit of $2.9 million for the same period in 2021 primarily due to a decrease in the valuation allowance recorded against increases in deferred tax assets included in AOCI for both the nine months ended September 30, 2022 and the nine months ended September 30, 2021.

The following discussion provides greater detail about our year-to-date segment performance.

Ethanol Production Segment

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

	Nine Months Ended September 30,		
	2022	2021	% Variance
Ethanol sold (thousands of gallons)	646,927	550,127	17.6%
Distillers grains sold (thousands of equivalent dried tons)	1,695	1,459	16.2
Corn oil sold (thousands of pounds)	204,502	156,835	30.4
Corn consumed (thousands of bushels)	223,830	189,544	18.1%

Revenues in our ethanol production segment increased $742.4 million for the nine months ended September 30, 2022 compared with the same period in 2021, primarily due to higher average selling prices on ethanol, distillers grains and corn oil resulting in increased revenues of $278.1 million, $59.1 million and $42.5 million, respectively, and higher ethanol, distillers grains and corn oil volumes sold resulting in increased revenues of $217.8 million, $45.3 million and $22.8 million, respectively. Revenues also increased as a result of hedging activities by $79.5 million.

Cost of goods sold in our ethanol production segment increased $803.2 million for the nine months ended September 30, 2022 compared with the same period last year primarily due to higher weighted average corn prices, higher corn volumes processed and hedging activities, resulting in increased costs of $277.3 million, $206.4 million and $133.7 million, respectively, with the remainder of the increase primarily driven by higher utilities, freight and chemical costs.

Operating loss increased $56.8 million for the nine months ended September 30, 2022 compared with the same period in 2021 primarily due to decreased margins on ethanol production as outlined above. Depreciation and amortization expense for the ethanol production segment was $59.1 million for the nine months ended September 30, 2022, compared with $62.7 million for the same period last year.

Agribusiness and Energy Services Segment

Revenues in our agribusiness and energy services segment decreased $14.2 million while operating income increased $10.2 million for the nine months ended September 30, 2022, compared with the same period in 2021. The decrease in revenues was primarily due to a decrease in ethanol and corn oil trading volume. Operating income increased primarily as a result of higher trading margins.

Partnership Segment

Revenues generated by our partnership segment decreased $0.5 million for the nine months ended September 30, 2022 compared with the same period for 2021. Storage and throughput services revenue decreased $0.7 million due to a reduction in the contracted minimum volume commitment as a result of the sale of the Ord ethanol plant in the first quarter of 2021. Railcar transportation services revenue increased $0.9 million primarily due to an increase in capacity provided and higher fees charged on the volumetric capacity. Terminal services revenue decreased $0.3 million due to lower minimum volume commitment fees earned. Trucking and other revenue decreased $0.4 million primarily as a result of lower non-affiliate freight volume. Operating income decreased $1.3 million for the nine months ended September 30, 2022, compared with the same period in 2021.

Intersegment Eliminations

Intersegment eliminations of revenues increased by $3.7 million for the nine months ended September 30, 2022, compared with the same period in 2021 primarily due to increased intersegment marketing and service fees within the agribusiness and energy services segment as a result of higher production volumes.

Corporate Activities

Operating loss was impacted by an increase in corporate activities of $50.7 million for the nine months ended September 30, 2022 compared to the same period in 2021, primarily due to the $31.2 million net gain on sale of assets recorded in the same period last year, as well as increased personnel costs, professional fees and memberships, and travel costs during the nine months ended September 30, 2022.

Income Taxes

We recorded income tax benefit of $0.1 million for the nine months ended September 30, 2022, compared with income tax benefit of $2.9 million for the same period in 2021 primarily due to a decrease in the valuation allowance recorded against deferred tax assets included in AOCI for both the nine months ended September 30, 2022 and the nine months ended September 30, 2021.

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 the issuance of senior notes or equity. Our ability to access capital markets for debt financing under reasonable terms depends on numerous factors, including our past performance, current financial condition, credit risk profile and market conditions generally. We believe that our ability to obtain financing based on these factors remains sufficient and provides a solid foundation to meet our future liquidity and capital resource requirements.

On September 30, 2022, we had $420.8 million in cash and equivalents, excluding restricted cash. Additionally, we had $66.6 million in restricted cash and $25.0 million in marketable securities at September 30, 2022. We also had $155.0 million available under our committed revolving credit agreement, subject to restrictions and other lending conditions. Funds at certain subsidiaries are generally required for their ongoing operational needs and restricted from distribution. At September 30, 2022, our subsidiaries had approximately $115.4 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 used in operating activities was $34.5 million for the nine months ended September 30, 2022, compared with net cash used in operating activities of $27.9 million for the same period in 2021. Net cash used in operating activities compared to the prior year were primarily affected by a higher net loss as well as increases in cash used related to derivative financial instruments, offset by decreases in cash used related to accounts receivable and a decrease related to the gain on sale of assets when compared to the same period of the prior year. Net cash used in investing activities was $90.3 million for the nine months ended September 30, 2022, compared with net cash used in investing activities of $43.5 million for the same period in 2021. Investing activities compared to the prior year were primarily affected by the increased purchases of fixed assets, offset by proceeds from the sale of marketable securities during the first quarter of 2022. Net cash provided by financing activities was $51.2 million for the nine months ended September 30, 2022, compared with net cash provided by financing activities of $517.4 million for the same period in 2021, primarily due to proceeds from the issuance of common stock and debt offerings and proceeds during the same period in 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 had capital expenditures of approximately $183.2 million during the nine months ended September 30, 2022, primarily for Ultra-High Protein expansion projects at various facilities and for various maintenance projects. Capital spending for the remainder of 2022 is expected to be between $70.0 million and $100.0 million for various projects, including the Ultra-High Protein expansion at our Obion, Central City and Mount Vernon locations, 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, 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.

For each calendar quarter commencing with the quarter ended September 30, 2015, the partnership agreement requires the partnership to distribute all available cash, as defined, to its partners, including us, within 45 days after the end of each calendar quarter. 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 shares during the third quarter of 2022. To date, we have repurchased 7,396,936 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

For additional information related to our debt, see *Note 8 – Debt* included as part of the notes to consolidated financial statements and *Note 12 – Debt* included as part of the notes to consolidated financial statements included in our annual report on Form 10-K for the year ended December 31, 2021.

We were in compliance with our debt covenants at September 30, 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 8 - Debt*, we use LIBOR as a reference rate for our Green Plain Partners term loan. 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 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 Rate 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.

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, beginning September 15, 2021. 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; the event of a cash dividend or distribution; 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. We may settle the 2.25% notes in cash, common stock or a combination of cash and common stock. At September 30, 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. The final conversion rate was increased to 66.4178 in connection with the company's 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, 3,568,705 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 all 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 and 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. 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 is 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 the 4.125% notes due 2022, in privately negotiated transactions.

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. Additionally, on September 1, 2022, approximately $1.7 million aggregate principal amount were settled through a combination of $1.7 million in cash and approximately 15 thousand 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 three months ended September 30, 2022.

Additionally, on September 1, 2022, the remaining $23 thousand aggregate principal amount and accrued interest were settled in cash. The 4.125% notes were retired effective September 1, 2022.

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. 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 September 30, 2022, the outstanding principal balance was $195.0 million on the facility and the interest rate was 6.11%.

Green Plains Commodity Management has an uncommitted $40.0 million revolving credit facility which matures April 30, 2023, to finance margins related to its hedging programs. Advances are subject to variable interest rates equal to SOFR plus 1.75%. At September 30, 2022, the outstanding principal balance was $11.1 million on the facility and the interest rate was 4.73%.

Green Plains Grain has a short-term inventory financing agreement with a financial institution. The company has accounted for the agreement as short-term notes, rather than revenues, and has elected the fair value option to offset fluctuations in market prices of the inventory. The 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 September 30, 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 September 30, 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 the company, have a $75.0 million delayed draw loan agreement, which matures on September 1, 2035. At September 30, 2022, the outstanding principal balance was $75.0 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.

Partnership Segment

On July 20, 2021, the partnership entered into an Amended and Restated Credit Agreement (“Amended Credit Agreement”) with funds and accounts managed by BlackRock and TMI Trust Company as administrative agent creating a $60.0 million term loan to fund working capital, capital expenditures and other general partnership purposes. The amended term loan matures July 20, 2026. 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.

Under the terms of the Amended Credit Agreement, 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.

On February 11, 2022, the amended term 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. As of September 30, 2022, the term loan had a balance of $59.0 million and an interest rate of 11.19%.

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 September 30, 2022 totaled $75.1 million. As of September 30, 2022, we had contracted future purchases of grain, natural gas, and distillers grains valued at approximately $366.0 million and future commitments for storage and transportation valued at approximately $27.8 million. Refer to *Note 13 – Commitments and Contingencies* included in the notes to consolidated financial statements for more information.

Critical Accounting Policies and Estimates

Critical accounting policies, including those relating to impairment of long-lived assets and goodwill, derivative financial instruments, and accounting for income taxes, are impacted significantly by judgments, assumptions and estimates used in the preparation of the consolidated financial statements. Information about our critical accounting policies and estimates are included in our annual report on Form 10-K for the year ended December 31, 2021.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements.

Item 3. Quantitative and Qualitative 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 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 September 30, 2022, we had $703.2 million in debt, $265.1 million of which had variable interest rates. A 10% increase in interest rates would affect our interest cost by approximately $1.9 million per year.

For additional information related to our debt, see *Note 8 – Debt* included as part of the notes to consolidated financial statements and *Note 12 – Debt* included as part of the notes to consolidated financial statements included in our annual report on Form 10-K for the year ended December 31, 2021.

Commodity Price Risk

Our business is highly sensitive to commodity price risk, particularly for ethanol, corn, distillers grains, corn oil and natural gas. Ethanol prices are sensitive to world crude oil supply and demand, the price of crude oil, gasoline and 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, 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. During the three and nine months ended September 30, 2022, revenues included net gains of $3.5 million and $6.0 million, respectively, and cost of goods sold included net losses of $6.3 million and $68.5 million, respectively, associated with derivative financial 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 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 September 30, 2022, which is 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	$156,984
Corn	330,000	Bushels	$167,483
Distillers grains	2,500	Tons (2)	$44,382
Corn oil	290,000	Pounds	$10,512
Natural gas	27,700	MmBTU	$2,962

(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, 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 4. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures designed to ensure the 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 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 September 30, 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.

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 U.S. generally accepted accounting principles. There were no material changes in our internal control over financial reporting that occurred during the period covered by this report that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

PART II – OTHER INFORMATION

Item 1. Legal Proceedings.

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

Item 1A. Risk Factors.

Investors should carefully consider the discussion of risks and the other information in our annual report on Form 10-K for the year ended December 31, 2021, in Part I, Item 1A, "Risk Factors," and the discussion of risks and other information in Part I, Item 2, "Management's Discussion and Analysis of Financial Condition and Results of Operations," under "Cautionary Information Regarding Forward-Looking Statements," of this report. Investors should also carefully consider the discussion of risks with the partnership under the heading "Risk Factors" and other information in their annual report on Form 10-K for the year ended December 31, 2021. Although we have attempted to discuss key factors, our investors need to be aware that other risks may prove to be important in the future. New risks may emerge at any time and we cannot predict such risks or estimate the extent to which they may affect our financial performance. The following risk factors supplement and/or update risk factors previously disclosed and should be considered in conjunction with the other information included in, or incorporated by reference in, this quarterly report on Form 10-Q.

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

Our operating results are highly sensitive to the spread between the corn and natural gas we purchase, and the ethanol, including industrial-grade alcohol, distillers grains, Ultra-High Protein and 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, including industrial-grade alcohol, distillers grains, Ultra-High Protein and 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, including industrial-grade alcohol, distillers grains, Ultra-High Protein and 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, including industrial-grade alcohol, distillers grains, Ultra-High Protein and corn oil prices.

We continuously monitor the margins at our ethanol plants using a variety of risk management tools and hedging strategies when appropriate. The spread between ethanol and corn prices can fluctuate widely, and has been negative at times. Fluctuations are likely to continue. A sustained narrow spread or reduction in the spread between ethanol and corn prices as a result of increased corn prices or decreased ethanol prices, would adversely affect our results of operations and financial position. Should our combined revenue from ethanol, including industrial-grade alcohol, distillers grains, Ultra-High Protein and 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 also could 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 have seen considerable price volatility in corn prices not experienced in recent years. At certain corn prices, ethanol may be uneconomical to produce. 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 markets, supply or 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 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 octane and, to a lesser extent, a gasoline substitute. Consequently, gasoline supply and demand affect the price of ethanol. Should gasoline prices or demand decrease 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 is one of the most economical means for obligated parties to meet the advanced biofuel standard.

Industrial-grade alcohol is produced by further distillation processing of 200-proof alcohol. Further distillation removes impurities which allows it to be used as an ingredient for sanitation products. Should industrial-grade alcohol prices or demand decrease significantly, or competition and supply increase, our results of operations could be negatively impacted.

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

Under the provisions of the Energy Independence and Security Act of 2007, as amended, Congress expanded the RFS. 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.

According to the RFS, if mandatory renewable fuel volumes are reduced by at least 20% for two consecutive years, the EPA is required to modify, or reset, statutory volumes through 2022; the year through which the statutorily prescribed volumes run. While conventional ethanol maintained 15 billion gallons, 2019 was the second consecutive year that the total RVO was more than 20% below the statutory volumes levels. Thus, the EPA was expected to initiate a reset rulemaking, and modify statutory volumes through 2022, and do so based on the same factors they are to use in setting the RVOs post-2022. However, on December 19, 2019, the EPA announced it would not be moving forward with a reset rulemaking. It is unclear when or if they will propose a reset rulemaking. The EPA has stated an intention to propose a post-2022 set rulemaking by November 16, 2022, and finalize 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. A small refinery is defined as one that processes fewer than 75,000 barrels of petroleum per day.

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 conjuction with the RVO rulemaking for 2020, 2021 and 2022, denied all pending SREs. There are multiple legal challenges to how the EPA has handled SREs and RFS rulemakings.

A recent D.C. Circuit Court of Appeals ruling held 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 2,743 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 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.

The ability or willingness of OPEC and other oil exporting nations to set and maintain production levels and/or the impact of sanctions on Russia related to the war in Ukraine may have 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. For example, OPEC+ and certain other oil exporting nations have previously agreed to take measures, including production cuts, to support crude oil prices. In March 2020, members of OPEC+ considered extending and potentially increasing these oil production cuts, however these negotiations were unsuccessful. As a result, Saudi Arabia announced an immediate reduction in export prices and Russia announced that all previously agreed oil production cuts expired on April 1, 2020. These actions led to an immediate and steep decrease in oil prices. Conversely, sanctions imposed on Russia in the last few months have increased prices. In October 2022, OPEC+ agreed to reduce production, which has led to increased prices. There can be no assurance that OPEC+ members and other oil exporting nations will adhere to production cuts, agree to future production cuts or take other actions to support and stabilize oil prices, nor can there be any assurance that sanctions or other global conflicts will not further impact oil prices. Uncertainty regarding future sanctions or 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.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds.

Employees surrender shares when restricted stock grants are vested to satisfy statutory minimum required payroll tax withholding obligations.

The following table lists the shares that were surrendered during the third quarter of 2022:

Period	Total Number of Shares Withheld for Employee Awards	Average Price Paid per Share
July 1 - July 31	—	$ —
August 1 - August 31	416	38.22
September 1 - September 30	—	—
Total	416	$ 38.22

Our board of directors authorized a share repurchase program of up to $200 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 the third quarter of 2022. Since inception of the repurchase program, the company has repurchased 7,396,936 shares of common stock for approximately $92.8 million under the program.

Other than as previously reported, during the three months ended September 30, 2022, we issued the following shares without registering the shares under the Securities Act:

On September 1, 2022, the noteholders of the 4.125% Convertible Senior Notes due in 2022 (the "2022 Notes"), settled $1,743,000 of principal through a combination of $1.7 million in cash and 15,093 shares of the company's $0.001 par value common stock at a conversion rate of $37.93 per share. The remaining $23,000 of principal of the 2022 Notes and accrued interest were settled in cash. The 2022 Notes principal was $0 after the conversion on September 1, 2022 and were effectively retired.

The issuance of treasury shares of common stock for the 2022 Notes was made pursuant to an exemption from registration provided in Section 3(a)(9) of the Securities Act of 1993, as amended.

Item 3. Defaults Upon Senior Securities.

None.

Item 4. Mine Safety Disclosures.

Not applicable.

Item 5. Other Information.

None.

Item 6. Exhibits.

Exhibit Index

Exhibit No.	Description of Exhibit
10.1	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.
10.2	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).
10.3	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).
10.4	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).
10.5	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).
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 Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2022, formatted in Inline Extensible Business Reporting Language (iXBRL): (i) Consolidated Balance Sheets, (ii) Consolidated Statements of Operations, (iii) Consolidated Statements of Comprehensive Income, (iv) Consolidated Statements of Cash Flows, and (v) the Notes to Consolidated Financial Statements
104	The cover page from Green Plains Inc.'s Quarterly Report on Form 10-Q for the quarterly period ended September 30, 2022, formatted in iXBRL.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

GREEN PLAINS INC.
(Registrant)

Date: November 3, 2022	By:	*/s/ Todd A. Becker*
		Todd A. Becker
		President and Chief Executive Officer
		(Principal Executive Officer)
Date: November 3, 2022	By:	*/s/ James E. Stark*
		James E. Stark
		Chief Financial Officer
		(Principal Financial Officer)

AMENDMENT NO. 6 TO RAIL TRANSPORTATION SERVICES AGREEMENT

THIS AMENDMENT NO. 6 TO RAIL TRANSPORTATION SERVICES AGREEMENT (this "Amendment"), is entered into and effective as of the 16 day of August, 2022 (the "Effective Date"), by and between Green Plains Logistics LLC (the "Operator") and Green Plains Trade Group LLC (the "Customer"). Customer and Operator are sometimes referred to in this Amendment as the "Parties" and individually as a "Party".

WHEREAS, Operator wishes to amend the Rail Transportation Services Agreement effective July 1, 2015, as amended, between the Parties (the "Agreement") on the terms and conditions set forth herein with terms used herein not defined herein having the meaning set forth in the Agreement;

NOW THEREFORE, in consideration of the mutual premises of the Parties and covenants and conditions hereinafter set forth, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound, the Parties hereto agree as follows:

1. Section 9 of the Agreement is hereby replaced in its entirety with the following:

   Term. The initial term, of this Agreement shall continue for a period until June 30, 2029 (the "Initial Term") and shall automatically renew for successive twelve (12) month terms thereafter (each such term, a "Renewal Term" and all Renewal Terms, together with the Initial Term, the "Term") until terminated by either party by providing 360 days written notice of such termination to the other party.

IN WITNESS WHEREOF, the Parties hereto have executed this Amendment as of the day and year first above written.

OPERATOR: GREEN PLAINS LOGISTICS LLC

Signature: */s/ Michelle Mapes*
Name: Michelle Mapes
Title: Chief Legal & Administration Officer

CUSTOMER: GREEN PLAINS TRADE GROUP LLC

Signature: */s/ Michelle Mapes*
Name: Michelle Mapes
Title: Chief Legal & Administration Officer

EXHIBIT E-4

Effective as of August 16, 2022
LOADING POINTS

O'Neill, Nebraska
Central City, Nebraska
Fairmont, Minnesota
Hopewell, Virginia
Madison, Illinois
Mount Vernon, Indiana
Obion, Tennessee
Otter Tail, Minnesota
Shenandoah, Iowa
Superior, Iowa
Wood River, Nebraska
York, Nebraska

Exhibit 31.1

CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO RULE 13a-14(a) AND SECTION 302 OF THE SARBANES OXLEY ACT OF 2002

I, Todd A. Becker, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Green Plains Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant’s fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 3, 2022

/s/ Todd A. Becker
Todd A. Becker
President and Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO RULE 13a-14(a) AND SECTION 302 OF THE SARBANES OXLEY ACT OF 2002

I, James E. Stark, certify that:

1. I have reviewed this Quarterly Report on Form 10-Q of Green Plains Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;

   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant’s fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: November 3, 2022

/s/ James E. Stark

James E. Stark
Chief Financial Officer
(Principal Financial Officer)

Exhibit 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**

In connection with the Quarterly Report of Green Plains Inc. (the "company") on Form 10-Q for the fiscal quarter ended September 30, 2022, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Todd A. Becker, President and Chief Executive Officer of the company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

1) The Report fully complies with the requirements of Sections 13(a) or 15(d) of the Securities Exchange Act of 1934; and

2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the company.

Date: November 3, 2022

/s/ Todd A. Becker

Todd A. Becker
President and Chief Executive Officer

Exhibit 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

In connection with the Quarterly Report of Green Plains Inc. (the "company") on Form 10-Q for the fiscal quarter ended September 30, 2022, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, James E. Stark, Chief Financial Officer of the company, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to my knowledge:

1) The Report fully complies with the requirements of Sections 13(a) or 15(d) of the Securities Exchange Act of 1934; and

2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the company.

Date: November 3, 2022

/s/ James E. Stark

James E. Stark

Chief Financial Officer