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Green Plains Inc.
Form 10-K
February 20, 2019

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

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

For the fiscal year ended December 31, 2018

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: Common Stock, \$.001 par value

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Name of exchanges on which registered: Nasdaq Global Market

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

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

Yes No

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

Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

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

Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. .

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

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Non-accelerated filer (Do not check if a smaller reporting company)

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 Act). Yes No

The aggregate market value of the company's voting common stock held by non-affiliates of the registrant as of June 29, 2018 (the last business day of the second quarter), based on the last sale price of the common stock on that date of \$18.30, was approximately \$711.2 million. For purposes of this calculation, executive officers and directors are deemed to be affiliates of the registrant.

As of February 14, 2019, there were 41,039,553 shares of the registrant's common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement for the 2019 Annual Meeting of Shareholders are incorporated by reference in Part III herein. The company intends to file such Proxy Statement with the Securities and Exchange Commission no later than 120 days after the end of the period covered by this report on Form 10-K.

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Commonly Used Defined Terms

Green Plains Inc. and Subsidiaries:

Green Plains; the company	Green Plains Inc. and its subsidiaries
BioProcess Algae	BioProcess Algae LLC
Fleischmann’s Vinegar	Fleischmann’s Vinegar Company, Inc.
Green Plains Cattle	Green Plains Cattle Company LLC
Green Plains Grain	Green Plains Grain Company LLC
Green Plains Partners; the partnership	Green Plains Partners LP and its subsidiaries
Green Plains Processing	Green Plains Processing LLC and its subsidiaries
Green Plains Trade	Green Plains Trade Group LLC
SCI Ingredients	SCI Ingredients Holdings, Inc.

Accounting Defined Terms:

the Act	Tax Cuts and Jobs Act of 2017
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
IPO	Initial public offering of Green Plains Partners LP
LIBOR	London Interbank Offered Rate
LTIP	Green Plains Partners LP 2015 Long-Term Incentive Plan
Nasdaq	The Nasdaq Global Market
R&D Credits	Research and development tax credits
SEC	Securities and Exchange Commission
Securities Act	Securities Act of 1933, as amended

Industry Defined Terms:

Bgy	Billion gallons per year
BTU	British Thermal Units
CAFE	Corporate Average Fuel Economy
CARB	California Air Resources Board
CFTC	Commodity Futures Trading Commission
DOT	U.S. Department of Transportation
E15	Gasoline blended with up to 15% ethanol by volume
E85	Gasoline blended with up to 85% ethanol by volume
EIA	U.S. Energy Information Administration
EISA	Energy Independence and Security Act of 2007, as amended
EPA	U.S. Environmental Protection Agency
EU	European Union
FDA	U.S. Food and Drug Administration
FSMA	Food Safety Modernization Act of 2011
ILUC	Indirect land usage charge
LCFS	Low Carbon Fuel Standard
MMBTU	Million British Thermal Units
Mmg	Million gallons
Mmgy	Million gallons per year
MTBE	Methyl tertiary-butyl ether
MVC	Minimum volume commitment
NAFTA	North American Free Trade Agreement
RFS II	Renewable Fuels Standard II
RIN	Renewable identification number
RVO	Renewable volume obligation
TTB	Alcohol and Tobacco Tax and Trade Bureau
U.S.	United States
USDA	U.S. Department of Agriculture

Cautionary Statement Regarding Forward-Looking Statements

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

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

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

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

PART I

Item 1. Business.

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

Overview

Green Plains is an Iowa corporation, founded in June 2004 as an ethanol producer. We have grown through acquisitions of ethanol production facilities and adjacent commodity processing businesses. We are focused on generating stable operating margins through our business segments and risk management strategy. We own and operate assets throughout the ethanol value chain: upstream, with grain handling and storage; through our ethanol production facilities; and downstream, with marketing and distribution services to mitigate commodity price volatility, which differentiates us from companies focused only on ethanol production. Our other businesses, including our partnership and cattle feeding operations leverage our supply chain, production platform and expertise.

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 IPO on July 1, 2015. As of December 31, 2018, we own a 49.1% limited partner interest, a 2.0% general partner interest and all of the partnership’s incentive distribution rights. The public owns the remaining 48.9% limited partner interest. The partnership is consolidated in our financial statements.

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

- Ethanol Production. Our ethanol production segment includes the production of ethanol, distillers grains and corn oil at 13 ethanol plants in Illinois, Indiana, Iowa, Minnesota, Nebraska, Tennessee and Texas. At capacity, our facilities are capable of processing approximately 387 million bushels of corn per year and producing approximately 1.1 billion gallons of ethanol, 2.9 million tons of distillers grains and 292 million pounds of industrial grade corn oil, making us one of the largest ethanol producers in North America. On November 15, 2018, we completed the sale of three ethanol plants located in Bluffton, Indiana, Lakota, Iowa and Riga, Michigan and announced the permanent closure of our ethanol plant located in Hopewell, Virginia.

- **Agribusiness and Energy Services.** Our agribusiness and energy services segment includes grain procurement, with approximately 47.2 million bushels of grain storage capacity, and our commodity marketing business, which markets, sells and distributes ethanol, distillers grains and corn oil produced at our ethanol plants. We also market ethanol for a third-party producer as well as buy and sell ethanol, distillers grains, corn oil, crude oil, grain, natural gas and other commodities in various markets.
- **Food and Ingredients.** Our food and ingredients segment includes six cattle feeding operations with the capacity to support approximately 355,000 head of cattle and grain storage capacity of approximately 11.7 million bushels and food-grade corn oil operations. Fleischmann's Vinegar, one of the world's largest producers of food-grade industrial vinegar, was also included in the food and ingredients segment until its sale on November 27, 2018.
- **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 32 ethanol storage facilities, seven fuel terminal facilities and approximately 2,840 leased railcars.

Risk Management and Hedging Activities

Our profitability is highly dependent on commodity prices, particularly for ethanol, corn, distillers grains, corn oil, natural gas and cattle. Since market price fluctuations among these commodities are not always correlated, ethanol production or our cattle feeding operations may be unprofitable at times. We use a variety of risk management tools and hedging strategies to monitor real-time operating price risk exposure at each of our operations to obtain favorable margins, when available, or temporarily reduce production levels during periods of compressed margins.

We use forward contracts to sell a portion of our ethanol, distillers grains, and corn oil production or buy some of the corn, natural gas, cattle, or ethanol we need to partially offset commodity price volatility. We also engage in other hedging transactions involving exchange-traded futures contracts for corn, natural gas, ethanol, cattle and other commodities. The

financial impact of these activities depends on the price of the commodities involved and our ability to physically receive or deliver those commodities.

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

Competitive Strengths

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

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

Operational Excellence. Our facilities are staffed with experienced industry personnel who share operational knowledge and expertise. We focus on making incremental operational improvements to enhance performance using real-time production data and systems to monitor our operations and optimize performance. Additionally, our operational expertise helps us improve the operating margins of acquired facilities.

Technology Integration. Over our history, we have incorporated new technologies like corn oil extraction and Selective Milling Technology™ into our manufacturing processes that have enabled us to run more efficiently and improve our financial results. We continue to evaluate additional technological opportunities to expand our capabilities and product offerings in the coming years.

Proven Management Team. Our senior management team averages approximately 25 years of commodity risk management and related industry experience. We have specific expertise across all of our businesses, including plant operations and management, commodity markets and risk management, and ethanol marketing and distribution. Our management team's level of operational and financial expertise is essential to successfully executing our business strategies.

Business Strategy

We believe ethanol could become an increasingly larger portion of the global fuel supply driven by heightened environmental concerns and energy independence goals, supported by government policies and regulations. In the 1990's, federal law required the use of oxygenates in reformulated gasoline to reduce vehicle emissions in cities with unhealthy levels of air pollution. Today, ethanol is the primary oxygenate used by the U.S. refining industry to meet various federal and state air emission standards. The high octane value of ethanol has also made it the primary additive used by refiners to increase octane value, which improves engine performance. Accordingly, ethanol has become a valuable blend component that comprises approximately 10% of the domestic gasoline supply with the potential to grow with higher blends and increased gasoline demand. Ethanol usage is further supported by federal government mandates under RFS II, which assigns individual refiners, blenders and importers the volume of renewable fuels they are obligated to use based on their percentage of total fuel sales. Advances in domestic corn yields have helped the U.S. ethanol industry become the lowest-cost producer of ethanol, surpassing Brazil, creating demand for U.S. ethanol worldwide.

We also believe that the world will continue to increase its demand for protein for human consumption, driving the need to produce larger amounts of high protein feed for animals and aquaculture. With new technologies introduced in the ethanol industry, we believe that ethanol production facilities can increasingly become high-protein feed producers. We have begun to deploy one of these new technologies in an effort to capture higher co-product returns, which could lead to an accelerated deployment of additional high-protein process technology installments at a number of our ethanol production facilities to take advantage of the world's growing demand for protein.

In light of the ethanol industry's environment, we are focused on maintaining a low-cost ethanol production platform and driving costs out where possible. Owning grain storage at or near our ethanol plants allows us to develop relationships with local producers and originate corn more effectively at a lower average cost. We purchase approximately two-thirds of our

corn volume directly from farmers and have 45 production days of storage capacity at or near our ethanol plants. We use our performance data to develop strategies that can be applied across our platform and embrace technological advances to improve operational efficiencies and yields, such as Selective Milling Technology™ and Enogen® corn enzyme technology, to lower our processing cost per gallon and increase production volumes.

We believe there is untapped value across our businesses and we intend to further develop and strengthen our business by identifying expansion projects that maximize our production capabilities and lower existing costs at our production facilities. We also seek to leverage our core competencies in adjacent businesses such as cattle feedlots, high protein animal feed and other commodity processing operations that maximize our operational and risk management expertise.

Recent Developments

The following is a summary of our significant developments during 2018. Additional information about these items can be found elsewhere in this report or in previous reports filed with the SEC.

Bartlett Cattle Company, L.P. Acquisition

On July 27, 2018, we entered into an asset purchase agreement to acquire two cattle feeding operations from Bartlett Cattle Company, L.P. for \$16.2 million, plus working capital of approximately \$106.6 million. The transaction includes two feed yards located in Sublette, Kansas and Tulia, Texas which added combined feedlot capacity of 97,000 head of cattle to the company's operations. The transaction was financed using cash on hand and proceeds from the Green Plains Cattle senior secured asset-based revolving credit facility. The transaction closed on August 1, 2018, following receipt of regulatory approval.

Sixth Amendment to Credit Agreement – Green Plains Cattle Company

On July 31, 2018, we entered into an amendment of the Green Plains Cattle senior secured asset-based revolving credit facility with a group of lenders led by Bank of the West and ING Capital LLC, increasing the maximum commitment from \$425.0 million to \$500.0 million. The amendment was completed to fund the additional working capital requirements related to the acquisition of the Sublette, Kansas and Tulia, Texas cattle feeding operations. The

amended credit facility also includes an accordion feature that enables the credit facility to be increased by up to \$100.0 million with agent approval.

3.25% Convertible Notes

During the three months ended September 30, 2018, we entered into exchange agreements with certain beneficial owners of our outstanding 3.25% convertible senior notes due 2018 (the “Old Notes”), pursuant to which such investors exchanged (the “Exchange”) \$56.8 million in aggregate principal amount of the Old Notes for \$56.8 million in aggregate principal amount of notes due October 1, 2019 (the “New Notes”). The New Notes were recorded at fair value at the time of the exchange, and we recorded a non-cash adjustment to additional paid-in capital of \$3.5 million, net of a \$1.2 million tax impact related to the difference in fair value of the embedded conversion option of the Old Notes and the New Notes. Following the closing of these agreements, \$6.9 million aggregate principal of the Old Notes remain outstanding. On October 1, 2018, the maturity date of the Old Notes, the remaining aggregate principal of \$6.9 million was paid.

Disposition of Bluffton, Lakota and Riga Ethanol Plants

On October 8, 2018, we, through wholly owned subsidiaries, entered into an asset purchase agreement for the sale of three ethanol plants located in Bluffton, Indiana, Lakota, Iowa, and Riga, Michigan, and certain related assets from subsidiaries, to Valero Renewable Fuels Company, LLC (“Valero”) for the sale price of \$319.8 million, including net preliminary working capital and other adjustments (the “Valero Transaction”). Correspondingly, the partnership’s storage assets located adjacent to such plants were sold to Green Plains Inc. for \$120.9 million (the “Partnership Transaction”). On November 15, 2018, we closed on both the Partnership Transaction and the Valero Transaction. We received as consideration from Valero approximately \$319.8 million, while the partnership received as consideration from the company 8.7 million partnership units and a portion of the general partner interest equating to 0.2 million equivalent limited partner units to maintain the general partner’s 2% interest. These units were retired upon receipt. In addition, the partnership also received cash consideration of \$2.7 million from Valero for the assignment of certain railcar operating leases.

As part of the Partnership Transaction, we have agreed with the partnership to amend the storage and throughput agreement with Green Plains Trade to reduce the minimum volume commitment from 296.6 mmg of product per calendar quarter to 235.7 mmg. In addition, we agreed with the partnership to extend the storage and throughput agreement with Green Plains Trade an additional three years to June 30, 2028.

Third Amendment to Credit Agreement – Green Plains Operating Company LLC

On October 12, 2018, the partnership amended the revolving credit facility to allow the sale of the ethanol storage assets of up to six ethanol plants owned by Green Plains with no more than 600 million gallons of production capacity. In addition, the lenders permitted the exchange of units as consideration for the transaction and also permitted modifications of various key operating agreements. Upon close of the sale of assets associated with the Bluffton, Indiana, Lakota, Iowa, and Riga, Michigan ethanol plants, the revolving credit facility available was decreased from \$235.0 million to \$200.0 million. There were no other significant changes in other covenants.

Extension of Offer Period – JGP Energy Partners

On October 15, 2018, we agreed with the partnership to extend the offer period related to the potential purchase of the Green Plains interest in the JGP Energy Partners Beaumont, Texas terminal until June 30, 2019.

Disposition of Fleischmann's Vinegar

On October 23, 2018, we, along with an indirect wholly-owned subsidiary of the company, entered into a stock purchase agreement with Kerry Holding Co. (“Kerry”) to sell all of the issued and outstanding capital stock of Fleischmann's Vinegar (the “Kerry Transaction”). On November 27, 2018, we closed on the Kerry Transaction and received as consideration from Kerry \$353.9 million in cash and restricted cash, including preliminary net working capital adjustments.

Hopewell, Virginia Permanent Closure

On November 15, 2018, we announced the permanent closure of our ethanol plant located in Hopewell, Virginia. The closure did not change the partnership's quarterly storage and throughput minimum volume commitment with Green Plains Trade or current transload operations at that location.

Term Loan Repayment

In November 2018, we repaid the remaining balance of our \$500.0 million term loan due August 29, 2023 using a portion of the proceeds from the transactions described above. We did not incur any early termination penalties to the lenders as a result of the repayment.

Operating Segments

Ethanol Production Segment

Industry Overview. Ethanol, also known as ethyl alcohol or grain alcohol, is a colorless liquid produced by fermenting carbohydrates found in a number of different types of grains, such as corn, wheat and sorghum, and other cellulosic matter found in plants. Most of the ethanol produced in the United States is made from corn because it contains large quantities of carbohydrates that convert into glucose more easily than most other kinds of biomass, which can be handled efficiently and is in greater supply than other grains. According to the USDA, on average, one bushel, or 56 pounds, of corn, produces approximately 2.7 gallons of ethanol, 17.5 pounds of distillers grains and 0.7 pounds of corn oil. Outside of the United States, sugarcane is the primary feedstock used to produce ethanol.

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

Ethanol Plants. Following the sale of three ethanol plants located in Bluffton, Indiana, Lakota, Iowa and Riga, Michigan and the permanent closure of our ethanol plant located in Hopewell, Virginia, we now operate 13 dry mill ethanol production plants, located in seven states, that produce ethanol, distillers grains and corn oil:

Plant (1)	Initial Operation or Acquisition Date	Technology	Plant Production Capacity (mmgy)
Atkinson, Nebraska	June 2013	Delta-T	55
Central City, Nebraska	July 2009	ICM	116
Fairmont, Minnesota	Nov. 2013	Delta-T	119
Hereford, Texas	Nov. 2015	ICM/Lurgi	100
Madison, Illinois	Sept. 2016	Vogelbusch	90
Mount Vernon, Indiana	Sept. 2016	Vogelbusch	90
Obion, Tennessee (2)	Nov. 2008	ICM	120
Ord, Nebraska	July 2009	ICM	65
Otter Tail, Minnesota	Mar. 2011	Delta-T	55
Shenandoah, Iowa (2)	Aug. 2007	ICM	82
Superior, Iowa (2)	July 2008	Delta-T	60
Wood River, Nebraska	Nov. 2013	Delta-T	121
York, Nebraska	Sept. 2016	Vogelbusch	50
Total			1,123

- (1) The Hopewell, Virginia plant was permanently closed during the fourth quarter of 2018.
(2) We constructed these three plants; all other ethanol plants were acquired.

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

The majority of our plants are equipped with industry-leading ICM or Delta-T ethanol processing technology. Our years of experience building, acquiring and operating these technologies provides us with a deep understanding of how to effectively and efficiently manage both platforms for maximum performance.

Corn Feedstock and Ethanol Production. Our plants use corn as feedstock in a dry mill ethanol production process. Each of our plants requires approximately 17 million to 42 million bushels of corn annually, depending on its production capacity. The price and availability of corn are subject to significant fluctuations driven by a number of factors that affect commodity prices in general, including crop conditions, weather, governmental programs, freight

costs and global demand. Ethanol producers are generally unable to pass increased corn costs to customers.

Our corn supply is obtained primarily from local markets. We use cash and forward purchase contracts with grain producers and elevators to buy corn. We maintain direct relationships with local farmers, grain elevators and cooperatives, which serve as our primary sources of grain feedstock, at 11 of our ethanol plants. Most farmers in close proximity of our plants store corn in their own storage facilities. This allows us to purchase much of the corn we need directly from farmers throughout the year. At two of our ethanol plants, we contract with a third-party grain originator to supply the corn necessary for ethanol production. These contracts terminate in November 2023. Each of our plants is also situated on rail lines or has other logistical solutions to access corn supplies from other regions of the country should local supplies become insufficient.

Corn is received at the plant by truck or rail then weighed and unloaded into a receiving building. Grain storage facilities are used to inventory grain that is passed through a scalper to remove rocks and debris prior to processing. The corn is then transported to a hammer mill where it is ground into coarse flour and conveyed into a slurry tank for enzymatic processing. Water, heat and enzymes are added to convert the complex starch molecules into simpler carbohydrates. The slurry is heated to reduce the potential of microbial contamination and pumped into a liquefaction tank where additional enzymes are added. Next, the grain slurry is pumped into fermenters, where yeast, enzymes, and nutrients are added and the fermentation process is started. A beer column, within the distillation system, separates the alcohol from the spent grain mash. The alcohol is dehydrated to 200-proof alcohol and either pumped into a holding tank and blended with approximately 2% denaturant as it is pumped into finished product storage tanks, or marketed as undenatured ethanol.

Distillers Grains. The spent grain mash is pumped from the beer column into a decanter-type centrifuge for dewatering. The water, or thin stillage, is pumped from the centrifuge into an evaporator, where it is dried into a thick syrup. The solids, or wet cake, that exit the centrifuge are conveyed to the dryer system and dried at varying temperatures to produce distillers grains. Syrup may be reapplied to the wet cake prior to drying to provide additional nutrients. Distillers grains, the principal

co-product of the ethanol production process, are used as high-protein, high-energy animal feed and marketed to the dairy, beef, swine and poultry industries.

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

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

Corn Oil. Corn oil systems extract non-edible corn oil from the thin stillage evaporation process immediately before the production of distillers grains. Corn oil is produced by processing the syrup and evaporated thin stillage through a decanter-style, or disk-stack, centrifuge. The centrifuges separate the relatively light corn oil from the heavier components of the syrup, eliminating the need for significant retention time. We extract approximately 0.7 pounds of corn oil per bushel of corn used to produce ethanol. Industrial uses for corn oil include feedstock for biodiesel, livestock feed additives, rubber substitutes, rust preventatives, inks, textiles, soaps and insecticides. The syrup is blended into wet, modified wet or dried distillers grains.

Natural Gas. Depending on production parameters, our ethanol plants use approximately 20,000 to 45,000 BTUs of natural gas per gallon of production. We have service agreements to acquire the natural gas we need and transport the gas through pipelines to our plants.

Electricity. Our plants require between 0.5 and 1.5 kilowatt hours of electricity per gallon of production. Local utilities supply the necessary electricity to all of our ethanol plants.

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

Agribusiness and Energy Services Segment

Our agribusiness and energy services segment includes four grain elevators in four states with combined grain storage capacity of approximately 10.1 million bushels, and grain storage at our ethanol plants of approximately 37.1 million bushels, detailed in the following table:

Facility Location	On-Site Grain Storage Capacity (thousands of bushels)
Grain Elevators	
Archer, Nebraska	1,246
Essex, Iowa	3,841
Hopkins, Missouri	2,713
Kismet, Kansas	2,328
Ethanol Plants	
Atkinson, Nebraska	5,109
Central City, Nebraska	1,400
Fairmont, Minnesota	1,611
Hereford, Texas	4,913
Hopewell, Virginia (1)	1,043
Madison, Illinois	1,015
Mount Vernon, Indiana	1,034
Obion, Tennessee	8,168
Ord, Nebraska	2,571
Otter Tail, Minnesota	2,772
Shenandoah, Iowa	886
Superior, Iowa	2,955
Wood River, Nebraska	3,293
York, Nebraska	347
Total	47,245

(1) The Hopewell, Virginia plant was permanently closed during the fourth quarter of 2018.

We buy bulk grain, primarily corn and soybeans, from area producers, and provide grain drying and storage services to those producers. The grain is used as feedstock for our ethanol plants or sold to grain processing companies and area livestock producers. Bulk grain commodities are traded on commodity exchanges. Inventory values are affected by changes in these markets and spreads. To mitigate risks related to market fluctuations from purchase and sale

commitments of grain, as well as grain held in inventory, we enter into exchange-traded futures and options contracts that function as economic hedges at times.

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

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

Also through Green Plains Trade, we market wet and modified wet distillers grains to local markets and dried distillers grains to local, national and international markets. The bulk of our demand is delivered to geographic regions that do not have significant local corn or distillers grains production.

Our markets can be further segmented by geographic region and livestock industry. Most of our wet and modified wet distillers grains are sold to midwestern feedlot markets. A substantial amount of dried distillers grains are shipped by barge, containers and rail to regional and national markets, as well as international markets. Our dried distillers grains are shipped to feedlots and poultry markets, as well as Texas and West Coast rail markets. Some of our distillers grains are shipped by truck to dairy, beef, and poultry operations in the eastern United States. We also ship by railcar to eastern and southeastern feed mills, poultry and dairy operations, and domestic trade companies. We sell dried distillers grains directly to international markets and indirectly to exporters for shipment. In 2018, we exported approximately 18% of our distillers grains production,

with the largest export markets for distillers grains being Vietnam and Thailand. Access to diversified markets allows us to sell product to customers offering the highest net price.

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

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

Our railcar fleet for the agribusiness and energy services segment consists of approximately 480 leased hopper cars to transport distillers grains and approximately 80 leased tank cars to transport corn oil and crude oil. The initial terms of the lease contracts are for periods up to ten years.

Food and Ingredients Segment

Cattle feeding operations. Our cattle feeding operations have the capacity to support approximately 355,000 head of cattle and 11.7 million bushels of grain storage capacity.

Facility Location	Initial Operation or Acquisition Date	On-Site Cattle Capacity (thousands of cattle)	On-Site Grain Storage Capacity (thousands of bushels)
Kismet, Kansas	June 2014	73	2,193
Hereford, Texas	March 2017	35	-
Leoti, Kansas	May 2017	106	4,345
Eckley, Colorado	May 2017	49	3,070
Sublette, Kansas	August 2018	56	1,980
Tulia, Texas	August 2018	36	82

We purchase feeder cattle from producers, order buyers and livestock auctions, the majority of which are from Kansas, Missouri, Oklahoma and Texas. Generally, our feeder cattle are purchased at weights between 650 and 950 pounds. We typically feed the feeder cattle for approximately 175 days prior to selling to large beef processors at prices determined by the market, adjusted for quality. Bulk cattle commodities are traded on commodity exchanges. Inventory values are affected by changes in these markets and the spreads between feeder and live cattle futures.

Vinegar operations. Fleischmann's Vinegar is a liquid, natural specialty ingredients company serving a range of markets and end-use applications, including food and beverage flavoring ingredients, meat preservatives, antimicrobials, bio-herbicides, and cleaning products across the food, beverage, agricultural, industrial and consumer markets. Vinegar is sold primarily to major food industry participants, including leading branded food companies, private label food manufacturers and companies serving the foodservice channel. Vinegar products appeal to both food and non-food end market applications and are comprised of white distilled vinegar and numerous specialty vinegars, including balsamic, red wine, white wine, cider and other varietals for retail and industrial uses. On November 27, 2018, we sold Fleischmann's Vinegar.

Food-grade corn oil production. Our food-grade corn oil operations focus on shipping corn oil from facilities across the Midwest by rail or barge to terminal facilities located in the southern United States. Once the corn oil arrives at the terminal facility, it is unloaded and consolidated into set volumes and prepared for shipment by vessel. The corn oil is then shipped to independent refiners outside the United States for refining into a refined, bleached, dewaxed and deodorized food-grade product. This finished product is then shipped by vessel or container to our various customers. In addition, we also execute trade volumes of corn oil and soybean oil in both domestic and international markets.

Partnership Segment

Our partnership segment provides fuel storage and transportation services through (i) 32 ethanol storage facilities located at or near our 13 operational ethanol production plants and one non-operational ethanol production plant, (ii) seven fuel terminal facilities located near major rail lines, and (iii) a leased railcar fleet and other transportation assets.

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

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

To meet the challenge of marketing ethanol and distillers grains to diverse market segments, several of our plants are capable of simultaneously handling more than 150 railcars. Some of our locations have large loop tracks with unit train loading capabilities for both ethanol and dried distillers grains and spurs to connect the loop to the mainline or allow the movement and storage of railcars on site.

The partnership's railcar fleet consists of approximately 2,840 leased tank cars for the transportation of ethanol. The initial terms of the railcar lease agreements range from one to five years.

To optimize the partnership's railcar assets, we transport products other than ethanol depending on market opportunities and have used a portion of our railcar fleet to transport crude oil for third parties and to lease railcars to other users.

Terminal and Distribution Services. Ethanol is transported from the partnership's terminals to third-party terminal racks where it is blended with gasoline and transferred to the loading rack for delivery by truck to retail gas stations. The partnership owns and operates fuel holding tanks and terminals, and provide terminal services and logistics solutions to markets that do not have efficient access to renewable fuels. The partnership owns and operates fuel terminals at seven locations in six states with combined storage capacity of approximately 7.3 mmg and throughput capacity of approximately 762 mmgy. We also have 32 ethanol storage facilities located at or near our 13 operational ethanol production plants and one non-operational ethanol production plant with a combined storage capacity of approximately 31.9 mmg to support current ethanol production capacity of approximately 1.1 bgy.

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Facility Location	Storage Capacity (thousands of gallons)
Fuel Terminals	
Birmingham, Alabama - Unit Train Terminal	6,542
Birmingham, Alabama - Other	120
Bossier City, Louisiana	180
Collins, Mississippi	180
Little Rock, Arkansas	30
Louisville, Kentucky	60
Oklahoma City, Oklahoma	150
Ethanol Plants	
Atkinson, Nebraska (1)	2,074
Central City, Nebraska	2,250
Fairmont, Minnesota	3,124
Hereford, Texas	4,406
Hopewell, Virginia (2)	761
Madison, Illinois	2,855
Mount Vernon, Indiana	2,855
Obion, Tennessee	3,000
Ord, Nebraska	1,550
Otter Tail, Minnesota	2,000
Shenandoah, Iowa	1,524
Superior, Iowa	1,238
Wood River, Nebraska	3,124
York, Nebraska	1,100
Total	39,123

(1) The ethanol storage facilities are located approximately 16 miles from the ethanol plant.

(2) This facility was permanently closed during the fourth quarter of 2018.

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

Our Competition

Domestic Ethanol Competitors

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

As of January 15, 2019, the top five producers operated 69 plants and accounted for approximately 44% of the domestic production capacity with production capacities ranging from 800 mmgy to 1,700 mmgy. Approximately half of the 204 plants in the United States are standalone facilities and accounted for approximately 34% of domestic production capacity.

Demand for corn from ethanol plants and other corn consumers exists in all areas and regions in which we operate. According to the Renewable Fuels Association, there were 123 operational plants in the states where we have production facilities, including Illinois, Indiana, Iowa, Minnesota, Nebraska, Tennessee and Texas, as of January 15, 2019. The largest concentration of operational plants is located in Iowa, Nebraska and Illinois, where approximately 51% of all operational production capacity is located.

Foreign Ethanol Competitors

We also compete globally with production from other countries. Brazil is the second largest ethanol producer in the world after the United States. Brazil produces ethanol made from sugarcane, which may be less expensive to produce than ethanol made from corn depending on feedstock prices. Under RFS II, certain parties are obligated to meet an advanced biofuel standard. In recent years, sugarcane ethanol imported from Brazil has been one of the most economical means for obligated parties to meet this standard. Any significant additional ethanol production capacity could create excess supply in world markets, resulting in lower ethanol prices throughout the world, including the

United States.

Other Competition

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

In addition, we compete with other cattle feeding operations in competitive markets. Following the recent acquisitions of the Leoti, Kansas, Eckley, Colorado, Sublette, Kansas and Tulia, Texas cattle-feeding operations, we now operate the fourth largest cattle-feeding operations in the United States.

Regulatory Matters

Government Ethanol Programs and Policies

In the United States, the federal government mandates the use of renewable fuels under the RFS II. The EPA assigns individual refiners, blenders and importers the volume of renewable fuels they are obligated to use based on their percentage of total fuel sales. The EPA has the authority to waive the mandates in whole or in part if there is inadequate domestic renewable fuel supply or the requirement severely harms the economy or environment.

The RFS II has been a driving factor in the growth of ethanol usage in the United States. When the RFS II was established in October 2010, the required volume of “conventional” corn-based ethanol to be blended with gasoline was to increase each year until it reached 15.0 billion gallons in 2015, which left the EPA to address existing limitations in both supply (ethanol production) and demand (usage of ethanol blends in older vehicles). On November 30, 2018, the EPA announced the final 2019 renewable volume obligations for conventional ethanol, which met the 15.0-billion-gallon congressional target.

According to the RFS II, 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. While conventional ethanol maintained 15 billion gallons, 2019 is the second consecutive year the total proposed RVOs are more than 20% below statutory volumes levels. Thus, the EPA Administrator has directed his staff to initiate the reset rulemaking process, and the EPA will modify statutory volumes through 2022 based on the same factors used to set the RVOs post-2022. These factors include environmental impact, domestic energy security, expected production, infrastructure impact, consumer costs, job creation, price of ag commodities, food prices, and rural economic development.

Obligated parties use RINs to show compliance with RFS-mandated volumes. RINs are attached to renewable fuels by producers and detached when the renewable fuel is blended with transportation fuel or traded in the open market. The market price of detached RINs affects the price of ethanol in certain markets and influences the purchasing decisions by obligated parties. Higher RIN prices encourage more blending of ethanol.

Under the RFS II, a small refinery, that processes less than 75,000 barrels per day, can petition the EPA for a waiver of their requirement to submit RINs. The EPA, through consultation with the Department of Energy and the Department of Agriculture, can grant them a full or partial waiver, or deny it within 90 days of submittal. The EPA granted significantly more of these waivers in 2016 and 2017 than they had in previous years, totaling 790 million gallons of waived requirements for 2016 and 1.46 billion gallons for 2017. This effectively reduced the RFS II mandated volumes for those compliance years by those amounts, and has lowered RIN values significantly over the past calendar year.

Biofuels groups have filed a lawsuit in the U.S. Federal District Court for the D.C. Circuit, challenging the 2019 RVO rule over the EPA's failure to address small refinery exemptions in the rulemaking. This is the first RFS rulemaking since the expanded use of the exemptions came to light, however the EPA has refused to cap the number of waivers it grants or how it accounts for the retroactive waivers in its percentage standard calculations. The EPA has a statutory mandate to ensure the volume requirements are met, which are achieved by setting the percentage standards for obligated parties. The current approach accomplishes the opposite. Even if all the obligated parties comply with their respective percentage obligations for 2019, the nation's overall supply of renewable fuel will not meet the total volume requirements set by the EPA. This undermines Congressional intent of demand pressure creation and an increased consumption of renewable fuels. Biofuels groups argue the EPA must therefore adjust its percentage standard calculations to make up for past retroactive waivers and adjust the standards to account for any waivers it reasonably expects to grant in the future.

For further discussion see Item 7 – Management's Discussion and Analysis of Financial Condition and Results of Operations.

Environmental and Other Regulation

Our ethanol production, agribusiness and energy services, food and ingredients, and partnership segment activities are subject to various and extensive environmental and other regulations. We obtain environmental permits to operate our plants and other facilities.

Ethanol production involves the emission of various airborne pollutants, including particulate, carbon dioxide, oxides of nitrogen, hazardous air pollutants and volatile organic compounds. In 2007, the U.S. Supreme Court classified carbon dioxide as an air pollutant under the Clean Air Act in a case seeking to require the EPA to regulate carbon dioxide in vehicle emissions, which the EPA later addressed in RFS II.

While some of our plants operate as grandfathered at their current authorized capacity under the RFS II mandate, expansion above these capacities will require a 20% reduction in greenhouse gas emissions from a 2005 baseline measurement. This may require us to obtain additional permits, achieve the EPA's efficient producer status under the pathway petition program for our grandfathered plants, install advanced technology or reduce drying distillers grains.

CARB adopted LCFS requiring a 10% reduction in average carbon intensity of gasoline and diesel transportation fuels from 2010 to 2020. After a series of rulings that temporarily prevented CARB from enforcing these regulations, the State of California Office of Administrative Law approved the LCFS in November 2012, and revised LCFS regulations took effect in January 2013.

We employ maintenance and operations personnel at each of our plants. In addition to the attention we place on the health and safety of our employees, the operations of our facilities are regulated by the Occupational Safety and Health Administration.

For further discussion see Item 7 – Management’s Discussion and Analysis of Financial Condition and Results of Operations.

BioProcess Algae and Optimal Aquafeed Joint Ventures

We are the majority owner of the BioProcess Algae joint venture, which was formed in 2008. The joint venture is focused on growing algae in commercially viable quantities using feedstocks that are created as part of our ethanol production process. The joint venture continues to take steps towards commercialization. We are currently focused on animal nutrition, using proprietary technology to customize specific products, based on proven benefits, for relevant markets.

In 2018, we formed Optimal Aquafeed, a 50/50 joint venture to produce high-quality aquaculture feeds utilizing proprietary techniques and high-protein feed ingredients. The joint venture brings together Green Plains’ production capabilities, commodity expertise, and infrastructure and combines that with Optimal Fish Food LLC’s intellectual property, industry expertise and customer relationships.

Employees

On December 31, 2018, we had 1,194 full-time, part-time, temporary and seasonal employees, including 148 employees at our corporate office in Omaha, Nebraska.

Available Information

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

Item 1A. Risk Factors.

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

Risks Related to our Business and Industry

Our profitability is dependent on managing the spread between the price of corn, natural gas, ethanol, distillers grains, corn oil, and cattle.

Our operating results are highly sensitive to commodity prices, including the spread between the corn, natural gas, and feeder cattle we purchase, and the ethanol, distillers grains, corn oil and live cattle we sell. Price and supply are subject to various market forces, such as weather, domestic and global demand, shortages, export prices, crude oil prices, currency valuations and government policies in the United States and around the world, over which we have no control. Price volatility of these commodities may cause our operating results to fluctuate substantially. Increases in corn or natural gas prices or decreases in ethanol, distillers grains, corn oil and cattle prices may make it unprofitable to operate. No assurance can be given that we will purchase corn and natural gas or sell ethanol, distillers grains, corn oil and live cattle at or near current prices. Consequently, our results of operations and financial position may be adversely affected by increases in corn or natural gas prices or decreases in ethanol, distillers grains, corn oil and live cattle prices.

We continuously monitor the profitability of our ethanol plants and cattle feeding operations using a variety of risk management tools and hedging strategies, when appropriate. In recent years, the spread between ethanol and corn prices has fluctuated widely, narrowed significantly and been negative at times. Fluctuations are likely to continue. A sustained narrow spread or further 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, distillers grains 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 commodities we buy and sell are subject to price volatility and uncertainty.

Corn. We are generally unable to pass increased corn costs to our customers since ethanol competes with other fuels. 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 prices for alternative crops, increasing input costs, changes in government policies, shifts in global markets or damaging growing conditions, such as plant disease or adverse weather, including drought.

Ethanol. Our revenues are dependent on market prices for ethanol which can be volatile as a result of a number of factors, including: the price and availability of competing fuels; the overall supply and demand for ethanol and corn; the price of gasoline, crude oil and corn; and government policies.

Ethanol is marketed as a fuel additive that reduces vehicle emissions, an economical source of octanes and, to a lesser extent, a gasoline substitute. Consequently, gasoline supply and demand 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 II, sugarcane ethanol from Brazil is one of the most economical means for obligated parties to meet the advanced biofuel standard.

Distillers Grains. Increased U.S. dry mill ethanol production has resulted in increased distillers grains production. Should this trend continue, distillers grains prices could fall unless demand increases or other market sources are found. The price of distillers grains has historically been correlated with the price of corn. Occasionally, the price of distillers grains will lag behind fluctuations in corn or other feedstock prices, lowering our cost recovery percentage. Additionally, exports of distiller grains could be impacted by the enactment of foreign policy.

Distillers grains compete with other protein-based animal feed products. Downward pressure on other commodity prices, such as corn and soybeans, will generally cause the price of competing animal feed products to decline, resulting in downward pressure on the price of distillers grains.

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

Corn Oil. Industrial corn oil is generally marketed as a biodiesel feedstock; therefore, the price of corn oil is affected by demand for biodiesel. Reduced profitability in the biodiesel industry due to the lapsed blending tax credit could impact corn oil demand. In general, corn oil prices follow the prices of heating oil and soybean oil. Decreases in the price of corn oil could have an unfavorable impact on our business.

Cattle. The price and availability of feeder cattle are subject to volatile market conditions. These market conditions are often affected by factors beyond our control, such as weather, overall economic conditions and government regulations. Significant disruptions in feeder cattle supply could impair our ability to produce consistent results. Furthermore, increases in spreads between feeder and live cattle futures or changes in our cost relative to our competitors may adversely affect our results of operations and financial position. In addition, a significant disruption in cattle processing capacity could impair our ability to market live cattle at favorable prices which would affect our profitability.

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

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

Hedging arrangements expose us to risk of financial loss when the counterparty defaults on its contract or, in the case of exchange-traded contracts, when the expected differential between the price of the underlying and physical commodity changes. Hedging activities can result in losses when a position is purchased in a declining market or sold in a rising market. Hedging losses may be offset by a decreased cash price for corn, natural gas and feeder cattle and an increased cash price for

ethanol, distillers grains, live cattle and corn oil. We vary the amount of hedging and other risk mitigation strategies we undertake and sometimes choose not to engage in hedging transactions at all. We cannot provide assurance that our risk management strategies and decisions effectively offset commodity price volatility. If we fail to offset such volatility, our results of operations and financial position may be adversely affected.

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

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

Under the provisions of the EISA, Congress established a mandate setting the minimum volume of renewable fuels that must be blended with gasoline under the RFS II, which affects the domestic market for ethanol. 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.

Our operations could be adversely impacted by legislation or EPA actions, as set forth below or otherwise, that may reduce the RFS II mandated volumes of conventional ethanol and other biofuels. 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 II mandate, may affect future demand. A significant increase in supply beyond the RFS II mandate could have an adverse impact on ethanol prices. Moreover, changes to RFS II could negatively impact the price of ethanol or cause imported sugarcane ethanol to become more economical than domestic ethanol.

According to RFS II, 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. As the 2018 and 2019 total RVOs are more than 20% below statutory levels, the RVO reset has been triggered under the RFS II. The EPA Administrator has initiated the required technical analysis to address the reset rules which will require the EPA to modify statutory volumes through 2022 within one year of the trigger event, based on the same factors used to set the RVOs post-2022.

The U.S. Federal District Court for the D.C. Circuit ruled on July 28, 2017, in favor of the Americans for Clean Energy and its petitioners against the EPA related to its decision to lower the 2016 volume requirements. The Court concluded the EPA erred in how it interpreted the “inadequate domestic supply” waiver provision of RFS II, which authorizes the EPA to consider supply-side factors affecting the volume of renewable fuel available to refiners, blenders, and importers to meet the statutory volume requirements. As a result, the Court vacated the EPA’s decision to reduce the total renewable fuel volume requirements for 2016 through its waiver authority, which the EPA is expected to address as a part of the expected reset rule in 2019.

On November 22, 2017, the EPA issued a Notice of Denial of Petitions for rulemaking to change the RFS point of obligation which resulted in the EPA confirming the point of obligation will not change. However, Valero Energy and refining trade group American Fuel and Petrochemical Manufacturers (AFPM) have challenged the EPA’s handling of the U.S. biofuel mandate in separate actions on January 26, 2018. AFPM is asking the D.C. U.S. Court of Appeals to review the EPA’s November 2017 decision to reject proposed changes to the structure of the RFS, including moving the point of obligation from refiners and importers of fuel to fuel blenders. Valero filed two petitions with the same court, one seeking review of the annual Renewable Volume Obligation (RVO) rule set by the EPA for 2018 and 2019, which dictates the volumes of renewable fuels to be blended in the coming years, and a second arguing against the EPA’s December 2017 assertion that the agency has fulfilled its duty to periodically review the RFS as directed by statute.

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 RFS II mandate. A significant increase in supply beyond the RFS II mandate could have an adverse impact on ethanol prices. Moreover, any changes to RFS II 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. Recent actions by the EPA to grant small refiner exemptions as well as the Philadelphia Energy Solutions Bankruptcy Court’s decision to grant RIN relief have resulted in

lower RIN prices. The Acting EPA Administrator has indicated that the EPA is looking at taking a more structured approach to granting refinery exemptions, possibly granting partial waivers.

Flexible-fuel vehicles, which are designed to run on a mixture of fuels such as E85, receive preferential treatment to meet corporate average fuel economy standards in the form of CAFE credits. Flexible-fuel vehicle credits have been decreasing since 2014 and will be completely phased out by 2020. Absent CAFE preferences, auto manufacturers may not be willing to build flexible-fuel vehicles, reducing the growth of E85 markets and resulting in lower ethanol prices.

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

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

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

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

Demand for ethanol is also affected by overall demand for transportation fuel, which is affected by cost, number of miles traveled and vehicle fuel economy. Miles traveled typically increases during the spring and summer months related to vacation travel, followed closely behind the fall season due to holiday travel. Consumer demand for gasoline may be impacted by emerging transportation trends, such as electric vehicles or ride sharing. Additionally, factors

such as over-supply of ethanol, which has been the case in 2018, could negatively impact our business. Reduced demand for ethanol may depress the value of our products, erode margins, and reduce our ability to generate revenue or operate profitably.

Our business is directly affected by the supply and demand for ethanol and other fuels in the markets served by our assets. Miles traveled typically increases during the spring and summer months related to vacation travel, followed closely behind the fall season due to holiday travel. Additionally, reduced demand for ethanol may erode our margins and reduce our ability to generate revenue and operate profitably.

Owning and operating cattle feeding operations involves numerous external factors that are outside of our control.

Our cattle feeding operations involve numerous risks that could lead to increased costs or decreased demand for beef products, which could have an adverse effect on our results of operations and financial condition, including:

- constantly changing and potentially volatile supply and demand, which affect the cost of feeder cattle and feed ingredients and the sales price of our cattle;
- outbreak of disease in our or other cattle feeding operations or public perception that an outbreak has occurred, which could lead to inadequate supply, reduced consumer confidence in the safety and quality of beef products, adverse publicity, cancellation of orders and import or export restrictions;
 - liabilities in excess of our insurance policy limits or related uninsurable risks if outbreaks of disease or other conditions result in significant losses;
- extended periods of bad weather, including the combination of cold temperatures and precipitation, as well as blizzards or tornados;
- diminished access to international markets, including import trade restrictions due to disease or other perceived health or food safety issues, or changes in political or economic conditions;
- reduced red meat consumption due to dietary changes or other issues, leading to depressed cattle prices;
- the closure or extended shutdown of a major cattle packing plant, leading to depressed cattle prices;

- increased water costs due to water use restrictions, including those related to diminishing water table levels;
- operational restrictions resulting from government regulations; and
- risks relating to environmental hazards.

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

Ethanol and other products that we produce are or have been exported to Canada, Mexico, China and other countries. The current administration has expressed antipathy towards certain existing international trade agreements, including China NAFTA, and has significantly increased tariffs on goods imported into the United States, which in turn has led to retaliatory actions on US exports. As of the date of this Form 10-K, it remains unclear what the outcomes may be of NAFTA, other international trade agreements and tariffs on various goods. The President has threatened to withdraw the U.S. from NAFTA in order to leverage support for his updated version, the United States Mexico Canada Agreement or USMCA. The administration has also expressed a desire to negotiate new free trade agreements with China, Japan, the UK, the EU, and others. The current trade situation, the outcome of these negotiations or lack thereof, has had and/or may continue to have a material effect on our business, financial condition and results of operations.

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

Risks related to the level of debt we have include:

- requiring a sizeable portion of cash to be dedicated for debt service, reducing the availability of cash flow for working capital, capital expenditures, and other general business activities and limiting our ability to invest in new growth opportunities;
- limiting our ability to obtain additional financing for working capital, capital expenditures, acquisitions and other activities;
- limiting our flexibility to plan for or react to changes in the businesses and industries in which we operate;
- increasing our vulnerability to general and industry-specific adverse economic conditions;
- being at a competitive disadvantage against less leveraged competitors; and
- being vulnerable to increases in prevailing interest rates.

Most of our debt bears interest at variable rates, which creates exposure to interest rate risk. If interest rates increase, our debt service obligations at variable rates would increase even though the amount borrowed remained the same, decreasing net income.

Our ability to make scheduled payments of principal and interest or to refinance our debt depends on our future performance, which is subject to economic, financial, competitive and other factors beyond our control. Our business may not continue generating cash flow sufficient to service our debt. If we are unable to generate sufficient cash flows, we may be required to sell assets, restructure debt or obtain additional equity capital on terms that are onerous or highly dilutive. Our ability to refinance our debt will depend on capital markets and our financial condition at that time. We may not be able to engage in any of these activities or engage in these activities on desirable terms, which could result in default on our debt obligations.

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

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

In the past, we have received waivers from our lenders for failure to meet certain financial covenants and amended our loan agreements to change these covenants. In the event we are unable to comply with these covenants in the future, we cannot provide assurance that we will be able to obtain the necessary waivers or amend our loan agreements to prevent

default. Under our convertible senior notes, default on any loan in excess of \$10.0 million could result in the notes being declared due and payable, which would have a material and adverse effect on our ability to operate.

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

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

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

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

We may need additional capital to fund our growth or other business activities in the future. The cost of capital under our existing or future financing arrangements could increase and affect our ability to trade with various commercial counterparties or cause our counterparties to require additional forms of credit support. If capital markets are disrupted, we may not be able to access capital at all or capital may only be available under less favorable terms.

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

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

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

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

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

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

environmental regulations may require us to modify existing plant and processing facilities, which could significantly increase our cost of operations.

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

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

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

As we trade ethanol acquired from third-parties, should it be discovered the RINs associated with the ethanol we purchased are invalid, albeit unknowingly, we could be subject to substantial penalties if we are assessed the maximum amount allowed by law. Prior to 2013, the EPA assessed only modest penalties for RIN violations. However, based on EPA penalties assessed on RINS violations in the past few years, in the event of a violation, the EPA could assess penalties, which could have an adverse impact on our profitability.

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

Our plants emit carbon dioxide as a by-product of ethanol production. In February 2010, the EPA released its final regulations on RFS II, grandfathering our plants at their current authorized capacity. While some of our plants have received efficient producer status and no longer rely on grandfathered status, for those still reliant upon it, expansion above these levels will require a 20% reduction in greenhouse gas emissions from the 2005 baseline measurement. Separately, CARB adopted a LCFS that took effect in January 2013, which requires a 10% reduction in the average carbon intensity of gasoline and diesel transportation fuels from 2010 to 2020. An ILUC component is included in the greenhouse gas emission calculation, which may have an adverse impact on the market for corn-based ethanol in

California.

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

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

We have increased the size and diversity of our operations through mergers and acquisitions and intend to continue exploring potential growth opportunities. Acquisitions involve numerous risks that could harm our business, including:

- difficulties integrating the operations, technologies, products, existing contracts, accounting processes and personnel and realizing anticipated synergies of the combined business;
- risks relating to environmental hazards on purchased sites;
- risks relating to developing the necessary infrastructure for facilities or acquired sites, including access to rail networks;
- difficulties supporting and transitioning customers;
 - diversion of financial and management resources from existing operations;
- the purchase price exceeding the value realized;
- risks of entering new markets or areas outside of our core competencies;
- potential loss of key employees, customers and strategic alliances from our existing or acquired business;
- unanticipated problems or underlying liabilities; and

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- inability to generate sufficient revenue to offset acquisition and development costs.

The anticipated benefits of these transactions may not be fully realized or take longer to realize than expected.

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

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

We may be affected by our portfolio optimization strategy.

In May 2018, we announced that we were evaluating the performance of our entire portfolio of assets and businesses. As part of that process, during the fourth quarter of 2018, we sold three ethanol plants, permanently closed one ethanol plant and sold Fleischmann's Vinegar. As we continue to evaluate our portfolio, we may sell additional assets or businesses or exit particular markets that are no longer a strategic fit or no longer meet their growth or profitability targets. Depending on the nature of the assets sold, our profitability may be impacted by lost operating income or cash flows from such businesses. In addition, divestitures we complete may not yield the targeted improvements in our business and may divert management's attention from our day-to-day operations. Our failure to achieve the intended financial results associated with our portfolio optimization strategy could have an adverse effect on our business, financial condition or results of operations.

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

Long-lived assets, including property, plant and equipment, intangible assets, goodwill and equity method investments, are evaluated for impairment annually or whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Our impairment evaluations are sensitive to changes in key

assumptions used in our analysis and may require use of financial estimates of future cash flows. Application of alternative assumptions could produce significantly different results. We may be required to recognize impairments of long-lived assets based on future economic factors such as unfavorable changes in estimated future undiscounted cash flows of an asset group.

Global competition could affect our profitability.

We compete with producers in the United States and abroad. Depending on feedstock, labor and other production costs, producers in other countries, such as Brazil, may be able to produce ethanol cheaper than we can. Under RFS II, certain parties are obligated to meet an advanced biofuel standard. In recent years, sugarcane ethanol imported from Brazil has been one of the most economical means for obligated parties to meet this standard. While transportation costs, infrastructure constraints and demand may temper the impact of ethanol imports, foreign competition remains a risk to our business. Moreover, significant additional foreign ethanol production could create excess supply, which could result in lower ethanol prices throughout the world, including the United States. Any penetration of ethanol imports into the domestic market may have a material adverse effect on our operations, cash flows and financial position.

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

Government actions abroad can have a significant impact on our business. In 2018, we exported 19% of our ethanol production and 18% of our distillers grains production. In 2013, the EU imposed a five-year tariff of \$83.33 per metric ton on U.S. ethanol to discourage foreign competition. Effective January 1, 2017, China indicated its intention to raise its 5% tariff on U.S. and Brazil fuel ethanol to 30%. On April 1, 2018, China raised their tariff rate to 45%, and later raised it further to 70% in the tit for tat trade war. On December 1, 2018, following a meeting between Chinese President Xi and U.S. President Trump, the two countries announced they would be discussing a possible trade agreement over the next 90 days. Progress on, or success of these talks could lead to these ethanol tariffs being reduced or eliminated.

Although the ethanol export markets are affected by competition from other ethanol exporters, particularly Brazil, and in spite of the actions by China, we believe exports will remain active going forward. On September 1, 2017, Brazil's Chamber of Foreign Trade, or CAMEX, issued an official written resolution, imposing a 20% tariff on U.S. ethanol imports in excess of 150 million liters, or 39.6 million gallons per quarter. The ruling is valid for two years.

In January 2016, China's Ministry of Commerce initiated an anti-dumping investigation into U.S.-produced dried distillers grains exported to China. In January of 2017, the Ministry of Commerce of China announced it increased anti-dumping duties on U.S. distillers grains, ranging from 42.2% to 53.7%. According to the USDA, in 2018, approximately 31% of distillers grain produced in the United States was exported, up from 29% in 2017.

With more tariffs and reduced exports, the value of our products may be affected, which could have a negative impact on our profitability. Additionally, tariffs on U.S. ethanol may lead to further industry over-supply and reduce our profitability. Moreover, the America First trade position has caused more countries to toughen their positions on U.S. imports.

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

We operate in a very competitive environment and compete with other domestic ethanol producers in a relatively fragmented industry. The top five producers account for approximately 44% of the domestic production capacity with production capacity ranging from 800 mmgy to 1,700 mmgy. The remaining ethanol producers consist of smaller entities engaged exclusively in ethanol production and large integrated grain companies that produce ethanol in addition to their base grain businesses. We compete for capital, labor, corn and other resources with these companies.

Until recently, oil companies, petrochemical refiners and gasoline retailers were not engaged in ethanol production even though they form the primary distribution network for ethanol blended with gasoline. Over the past decade, several oil refiners have acquired ethanol production plants, and now account for almost 1/5 of domestic ethanol production. If these companies increase their ethanol plant ownership or additional companies commence production, the need to purchase ethanol from independent producers like us could diminish and adversely effect on our operations, cash flows and financial position.

Our agribusiness operations are subject to significant government regulations.

Our agribusiness operations are regulated by various government entities that can impose significant costs on our business. Failure to comply could result in additional expenditures, fines or criminal action. Our production levels, markets and grains we merchandise are affected by federal government programs, which include USDA acreage control and price support programs. Government policies such as tariffs, duties, subsidies, import and export

restrictions and embargos can also impact our business. Changes in government policies and producer support could impact the type and amount of grains planted, which could affect our ability to buy grain. Export restrictions or tariffs could limit sales opportunities outside of the United States.

Commodities futures trading is subject to extensive regulations.

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

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

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

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

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

Ethanol is used primarily as an octane additive and oxygenate blended with gasoline. Critics of ethanol blends argue that it decreases fuel economy, causes corrosion and damages fuel pumps. Prior to federal restrictions and ethanol mandates,

methyl tertiary-butyl ether, or MTBE, was the leading oxygenate. Other oxygenate products could enter the market and prove to be environmentally or economically superior to ethanol. Alternative biofuel alcohols, such as methanol and butanol, could evolve and replace ethanol.

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

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

We may be required to provide remedies for ethanol, distillers grains or corn oil that does not meet the specifications defined in our sales contracts.

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

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

In the last four years, we incurred operating losses during certain quarters and could incur operating losses in the future that are substantial. Although we have had periods of sustained profitability, we may not be able to maintain or increase profitability on a quarterly or annual basis, which could impact the market price of our common stock and the value of your investment.

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

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

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

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

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

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

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

assurance that our backup systems are sufficient to mitigate hardware or software failures, which could result in business disruptions that negatively impact our operating results and damage our reputation.

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

We rely on network infrastructure and enterprise applications, and internal technology systems for operational, marketing support and sales, and product development activities. The hardware and software systems related to such activities are subject to damage from earthquakes, floods, lightning, tornados, fire, power loss, telecommunication failures, cyber-attacks and other similar events. They are also subject to acts such as computer viruses, physical or electronic vandalism or other similar disruptions that could cause system interruptions and loss of critical data, and could prevent us from fulfilling customers' orders. Cybersecurity threats and incidents can range from uncoordinated individual attempts to gain unauthorized access to information technology networks and systems to more sophisticated and targeted measures, known as advanced persistent threats, directed at the company, its products, its customers and/or its third-party service providers. Despite the implementation of cybersecurity measures (including access controls, data encryption, vulnerability assessments, employee training, continuous monitoring, and maintenance of backup and protective systems), the company's information technology systems may still be vulnerable to cybersecurity threats and other electronic security breaches. While we have taken reasonable efforts to protect ourselves, and to date, we have not experienced any material breaches or material losses related to cyber-attacks, we cannot assure our shareholders that any of our security measures would be sufficient in the future. Any event that causes failures or interruption in such hardware or software systems could result in disruption of our business operations, have a negative impact on our operating results, and damage our reputation, which could negatively affect our financial condition, results of operation, cash flows.

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

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

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

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

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

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

There have been substantial changes to the Internal Revenue Code, some of which could have an adverse effect on our shareholders.

The Tax Cuts and Jobs Act enacted on December 22, 2017 and effective January 1, 2018 made significant changes to the Internal Revenue Code. The U.S. Department of Treasury has broad authority to issue regulations and interpretative guidance that may significantly impact how we will apply the law and impact our results of operations in the period issued.

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

We are exposed to credit risk from a variety of customers, including major integrated oil companies, large independent refiners, petroleum wholesalers, cattle packers and other ethanol plants. We are also exposed to credit risk with major suppliers of petroleum products and agricultural inputs when we make payments for undelivered inventories. Our fixed-price forward contracts are subject to credit risk when prices change significantly prior to delivery. The inability by a third party to

pay us for our sales, provide product that was paid for in advance or deliver on a fixed-price contract could result in a loss and adversely impact our liquidity and ability to make our own payments when due.

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

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

Increased federal support of cellulosic ethanol could result in increased competition to corn-based ethanol producers.

Legislation, including the American Recovery and Reinvestment Act of 2009 and EISA, provides numerous funding opportunities supporting cellulosic ethanol production. In addition, RFS II mandates an increasing level of biofuel production that is not derived from corn, though this will be amended lower by the EPA in the reset rulemaking. Federal policies suggest a long-term political preference for cellulosic processing using feedstocks such as switch grass, silage, wood chips or other forms of biomass. Cellulosic ethanol is viewed more favorably since the feedstock is not diverted from food production and has a smaller carbon footprint. Several cellulosic ethanol plants are currently under development. While these have had limited success to date, as research and development programs persist, there is risk that cellulosic ethanol could displace corn ethanol.

Any changes in federal mandates from corn-based to cellulosic-based ethanol production may reduce our profitability. Our plants are designed as single-feedstock facilities and would require significant additional investments to convert production to cellulosic ethanol. Furthermore, our plants are strategically located in high-yield, low-cost corn production areas. At present, there is limited supply of alternative feedstocks near our facilities. As a result, the adoption of cellulosic ethanol and its use as the preferred form of ethanol could have a significant adverse impact on our business.

We may not have adequate insurance to cover losses from certain events.

Losses related to risks that are not covered by insurance or available under acceptable terms such as war, riots or terrorism could have a material adverse effect on our operations, cash flows and financial position.

Certain of our ethanol production plants, and fuel terminals are located within recognized seismic and flood zones. We modified our facilities to comply with regional structural requirements for those regions of the country and obtained additional insurance coverage specific to earthquake and flood risks for the applicable plants and fuel terminals. We cannot provide assurance that these facilities would remain in operation should a seismic or flood event occur, which would adversely affect our operations.

Risks Related to the Partnership

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

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

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

The amount of cash the partnership can distribute depends on how much cash is generated from operations, which can fluctuate from quarter to quarter based on ethanol and other fuel volumes, handling fees, payments associated with minimum volume commitments, timely payments by subsidiaries and other third parties, and prevailing economic conditions. The amount of cash available for distribution also depends on the partnership's operating and general and administrative

expenses, capital expenditures, acquisitions and organic growth projects, debt service requirements, working capital needs, ability to borrow funds and access capital markets, revolving credit facility restrictions, cash reserves and other risks affecting cash levels. Increasing the partnership's borrowings or other debt to finance its growth strategy could increase interest expense, which could impact the amount of cash available for distributions.

There are no limitations in the partnership agreement regarding its ability to issue additional units. Should the partnership issue additional units in connection with an acquisition or expansion, the distributions on the incremental units will increase the risk that the partnership will be unable to maintain or increase distributions on a per unit basis.

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

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

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

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

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

We indirectly own and control the partnership and appoint all of its officers and directors. A majority of the executive officers and directors of the partnership are also officers or directors of our company. Although our directors and officers have a fiduciary responsibility to manage the company in a manner that is beneficial to us, as directors and

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

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

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

Risks Related to our Common Stock

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

Some of the many factors that can influence the price of our common stock include:

- our results of operations and the performance of our competitors;
- public's reaction to our press releases, public announcements and filings with the SEC;

- changes in earnings estimates or recommendations by equity research analysts who follow us or other companies in our industry;
- changes in general economic conditions;
- changes in market prices for our products or raw materials and related substitutes;
- sales of common stock by our directors, executive officers and significant shareholders;
- actions by institutional investors trading in our stock;
- disruptions in our operations;
- changes in our management team;
- other developments affecting us, our industry or our competitors; and
- U.S. and international economic, legal and regulatory factors unrelated to our performance.

In recent years the stock market has experienced significant price and volume fluctuations, which are unrelated to the operating performance of any particular company. These broad market fluctuations could materially reduce the price of our common stock price based on factors that have little or nothing to do with our company or its performance.

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

Our restated articles of incorporation, restated bylaws and Iowa's law contain anti-takeover provisions that could delay or prevent change in control of us or our management. These provisions discourage proxy contests, making it difficult for our shareholders to elect directors or take other corporate actions without the consent of our board of directors, which include:

- board members have three-year staggered terms;
- board members can only be removed for cause with an affirmative vote of no less than two-thirds of the outstanding shares;
- shareholder action can only be taken at a special or annual meeting, not by written consent except where required by Iowa law;
- shareholders are restricted from making proposals at shareholder meetings; and
- the board of directors can issue authorized or unissued shares of stock.

We are subject to the provisions of the Iowa Business Corporations Act, which prohibits combinations between an Iowa corporation whose stock is publicly traded or held by more than 2,000 shareholders and an interested shareholder for three years unless certain exemption requirements are met.

Provisions in the convertible notes could also make it more difficult or too expensive for a third party to acquire us. If a takeover constitutes a fundamental change, holders of the notes have the right to require us to repurchase their notes in cash. If a takeover constitutes a make-whole fundamental change, we may be required to increase the conversion rate for holders who convert their notes. In either case, the obligation under the notes could increase the acquisition cost and discourage a third party from acquiring us.

These items discourage transactions that could otherwise command a premium over prevailing market prices and may limit the price investors are willing to pay for our stock.

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

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

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

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

A portion of our owned real property is used to secure our loans. See Note 12 – Debt included as part of the notes to consolidated financial statements for information about our loan agreements.

Corporate

We lease approximately 54,000 square feet of office space at 1811 Aksarben Drive in Omaha, Nebraska for our corporate headquarters, which houses our corporate administrative functions and commodity trading operations.

Ethanol Production Segment

We own approximately 2,150 acres of land and lease approximately 78 acres of land at and around our ethanol production facilities. As detailed in our discussion of the ethanol production segment in Item 1 – Business, our ethanol plants have the capacity to produce approximately 1.1 billion gallons of ethanol per year.

Agribusiness and Energy Services Segment

We own approximately 54 acres of land at our four grain elevators. As detailed in our discussion in Item 1 – Business, our agribusiness and energy services segment facilities include four grain elevators with combined grain storage capacity of approximately 10.1 million bushels, and grain storage capacity at our ethanol plants of approximately 37.1 million bushels.

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

Food and Ingredients Segment

We own approximately 8,770 acres of land at our six cattle feeding operations. As detailed in our discussion of the food and ingredients segment in Item 1 – Business, our cattle feeding operations have the capacity to support approximately 355,000 head of cattle and 11.7 million bushels of grain storage capacity.

Partnership Segment

Our partnership owns approximately five acres of land and leases approximately 18 acres of land at seven locations in six states, as disclosed in Item 1 – Business, where its fuel terminals are located and owns approximately 47 acres of land and leases approximately two acres of land where its storage facilities are located at our ethanol production facilities.

Item 3. Legal Proceedings.

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

Item 4. Mine Safety Disclosures.

Not applicable.

PART II

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

Common Stock

Our common stock trades under the symbol "GPRE" on Nasdaq.

Holder of Record

We had 2,023 holders of record of our common stock, not including beneficial holders whose shares are held in names other than their own, on February 14, 2019. This figure does not include approximately 38.2 million shares held in depository trusts.

Dividend Policy

In August 2013, our board of directors initiated a quarterly cash dividend, which we have paid every quarter since and anticipate paying in future quarters. On February 6, 2019, our board of directors declared a quarterly cash dividend of \$0.12 per share. The dividend is payable on March 15, 2019, to shareholders of record at the close of business on February 22, 2019. Future declarations are subject to board approval and may be adjusted as our cash position, business needs or market conditions change.

Issuer Purchases of Equity Securities

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

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The following table lists the shares that were surrendered during the fourth quarter of 2018.

Month	Total Number of Shares Withheld	Average Price Paid per Share
October 1 - October 31	6,058	\$ 18.47
November 1 - November 30	14,270	15.86
December 1 - December 31	1,009	15.68
Total	21,337	\$ 16.59

In August 2014, we announced a share repurchase program of up to \$100 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.

The following table lists the shares repurchased under the share repurchase program during the fourth quarter of 2018.

Month	Number of Shares Repurchased	Average Price Paid per Share	Total Number of Shares Repurchased as Part of Repurchase Program	Approximate Dollar Value of Shares that may yet be Repurchased under the Program (in thousands)
October 1 - October 31	-	\$ -	909,667	\$ 83,268
November 1 - November 30	-	-	909,667	83,268
December 1 - December 31	209,682	14.18	1,119,349	80,290
Total	209,682	\$ 14.18	1,119,349	\$ 80,290

Since inception, the company has repurchased 1,119,349 shares of common stock for approximately \$19.7 million under the program.

Recent Sales of Unregistered Securities

None.

Equity Compensation Plans

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

Performance Graph

The following graph compares our cumulative total return with the S&P SmallCap 600 Index and the Nasdaq Clean Edge Green Energy Index (CELS) for each of the five years ended December 31, 2018. The graph assumes a \$100 investment in our common stock and each index at December 31, 2013, and that all dividends were reinvested.

	12/13	12/14	12/15	12/16	12/17	12/18
Green Plains Inc.	\$ 100.00	\$ 128.78	\$ 121.15	\$ 150.95	\$ 93.63	\$ 74.79
S&P SmallCap 600	100.00	105.76	103.67	131.20	148.56	135.96
Nasdaq Clean Edge Green Energy	100.00	107.02	114.81	113.17	155.32	140.36

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

Item 6. Selected Financial Data.

The statement of income data for the years ended December 31, 2018, 2017 and 2016 and the balance sheet data as of December 31, 2018 and 2017 are derived from our audited consolidated financial statements and should be read together with the accompanying notes included elsewhere in this report.

The statement of income data for the years ended December 31, 2015 and 2014 and the balance sheet data as of December 31, 2016, 2015 and 2014 are derived from our audited consolidated financial statements that are not included in this report, which describe a number of matters that materially affect the comparability of the periods presented.

The following selected financial data should be read together with Item 7 – Management’s Discussion and Analysis of Financial Condition and Results of Operations of this report. The financial information below is not necessarily indicative of results to be expected for any future period. Future results could differ materially from historical results due to numerous factors, including those discussed in Item 1A – Risk Factors of this report.

	Year Ended December 31,				
	2018 (1)	2017	2016	2015	2014
Statement of Income Data:					
(in thousands, except per share information)					
Revenues	\$ 3,843,353	\$ 3,596,166	\$ 3,410,881	\$ 2,965,589	\$ 3,235,611
Costs and expenses	3,727,623	3,554,420	3,319,193	2,904,512	2,949,337
Operating income (2)	115,730	41,746	91,688	61,077	286,274
Total other expense	95,722	84,897	53,337	39,612	35,844
Net income	36,734	81,631	30,491	15,228	159,504
Net income attributable to Green Plains	15,923	61,061	10,663	7,064	159,504
Earnings per share attributable to Green Plains:					
Basic	\$ 0.39	\$ 1.56	\$ 0.28	\$ 0.19	\$ 4.37
Diluted	\$ 0.39	\$ 1.47	\$ 0.28	\$ 0.18	\$ 3.96
Other Data: (Non-GAAP)					
EBITDA (unaudited and in thousands)	\$ 224,652	\$ 154,370	\$ 174,428	\$ 127,781	\$ 352,477

	Year Ended December 31,				
	2018	2017	2016	2015	2014
Balance Sheet Data (in thousands):					
Cash and cash equivalents	\$ 251,683	\$ 266,651	\$ 304,211	\$ 384,867	\$ 425,510
Current assets	1,206,642	1,206,471	1,000,576	912,577	903,415
Total assets	2,216,432	2,784,650	2,506,492	1,917,920	1,821,062
Current liabilities	833,700	886,261	594,946	438,669	511,540
Long-term debt	298,190	767,396	782,610	432,139	399,440
Total liabilities	1,153,443	1,725,514	1,527,301	959,011	1,023,613
Stockholders' equity	1,062,989	1,059,136	979,191	958,909	797,449

- (1) Fiscal year 2018 includes approximately eleven months of operations of the Bluffton, Indiana, Lakota, Iowa, Riga, Michigan and the Hopewell, Virginia ethanol plants, as well as Fleischmann's Vinegar.
- (2) Fiscal year 2018 includes the \$150.4 million gain on the sale of the Bluffton, Indiana, Lakota, Iowa, and Riga, Michigan ethanol plants, as well as Fleischmann's Vinegar during the fourth quarter.

Management uses earnings before interest, income taxes, depreciation and amortization, or EBITDA, to compare the financial performance of our business segments and manage those segments. Management believes EBITDA is a useful measure to compare our performance against other companies. EBITDA should not be considered an alternative to, or more meaningful than, net income or cash flow, which are determined in accordance with GAAP. EBITDA calculations may vary from company to company. Accordingly, our computation of EBITDA may not be comparable with a similarly titled measure of another company.

The following table reconciles net income to EBITDA for the periods indicated (in thousands):

	Year Ended December 31,				
	2018	2017	2016	2015	2014
Net income	\$ 36,734	\$ 81,631	\$ 30,491	\$ 15,228	\$ 159,504
Interest expense	101,025	90,160	51,851	40,366	39,908
Income tax expense (benefit)	(16,726)	(124,782)	7,860	6,237	90,926
Depreciation and amortization	103,619	107,361	84,226	65,950	62,139
EBITDA (unaudited)	\$ 224,652	\$ 154,370	\$ 174,428	\$ 127,781	\$ 352,477

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

General

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

Overview

Green Plains is an Iowa corporation, founded in June 2004 as an ethanol producer. We have grown through acquisitions of operationally efficient ethanol production facilities and adjacent commodity processing businesses. We are focused on generating stable operating margins through our diversified business segments and risk management strategy. We own and operate assets throughout the ethanol value chain: upstream, with grain handling and storage; through our ethanol production facilities; and downstream, with marketing and distribution services to mitigate commodity price volatility, which differentiates us from companies focused only on ethanol production. Our other businesses, including our partnership, cattle feeding operations and vinegar production, which was sold during the fourth quarter of 2018, leverage our supply chain, production platform and expertise.

Our profitability is highly dependent on commodity prices, particularly for ethanol, distillers grains, corn oil, corn, natural gas and cattle. 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 both our ethanol plants and cattle feedlots and lock in favorable margins or reduce production when margins are compressed. Our adjacent businesses integrate complementary but more predictable revenue streams that diversify our operations and profitability.

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

Industry Factors Affecting our Results of Operations

U.S. Ethanol Supply and Demand

According to the EIA, domestic ethanol production increased an average of 1% to 1.05 million barrels per day in 2018, compared with 1.03 million barrels per day in 2017. Refiner and blender input volume increased slightly to 914 thousand barrels per day for 2018, compared with 913 thousand barrels per day in 2017. Gasoline demand increased 49 thousand barrels per day, or 1% in 2018. U.S. domestic ethanol ending stocks increased by approximately 0.5 million barrels year over year to 23.2 million barrels. As of December 31, 2018, there were approximately 1,700 retail stations selling E15 in 30 states, up from 1,210 at the beginning of the year, according to Growth Energy.

Global Ethanol Supply and Demand

According to the USDA Foreign Agriculture Service, domestic ethanol exports for the eleven months ended November 30, 2018, were approximately 1.56 bg, up 31% from 1.19 bg for the same period in 2017. Brazil remained the largest export destination for U.S. ethanol, which accounted for 30% of domestic ethanol export volume despite

the 20% tariff on U.S. ethanol imports in excess of 150 million liters, or 39.6 million gallons per quarter, imposed in September 2017 by Brazil's Chamber of Foreign Trade, or CAMEX. Canada, India and the Netherlands accounted for 21%, 9% and 5%, respectively, of U.S. ethanol exports.

On April 1, 2018, China announced it would add an additional 15% tariff to the existing 30% tariff it had earlier imposed on ethanol imports from the United States and Brazil. China later raised the tariff further to 70% as the trade war escalated. On December 1, 2018, following a meeting between Chinese President Xi and U.S. President Trump, the two countries announced they would be discussing a possible trade agreement over the next 90 days.

The cost to produce the equivalent amount of starch found in sugar from \$3.50-per-bushel corn is 7 cents per pound. The average price of sugar was approximately 12 cents per pound during 2018, compared with an average of 16 cents per pound for 2017.

We currently estimate that net ethanol exports will reach between 1.6 billion gallons and 1.7 billion gallons in 2019 based on historical demand from a variety of countries and certain countries who seek to improve their air quality and eliminate MTBE from their own fuel supplies.

Co-Product Supply and Demand

During the fourth quarter of 2018, the market sentiment for cattle continued to be optimistic due to anticipated lower cost of feed, strong domestic beef consumption and robust export demand for beef. Corn prices remained on the lower end of their 2018 range, according to the Chicago Mercantile Exchange. Domestic beef consumption per capita in 2018 is projected to increase 1.2 pounds to 58.3 pounds per person compared with 2017. Export demand for beef is forecasted to increase approximately 2.3% in 2018 compared with 2017 according to the USDA.

Cow-calf operations continue to be profitable, which has supported a period of expansion. Drought has become less of a worry for continued feeder cattle production due to precipitation throughout 2018. Year-to-date domestic cattle on feed increased 3% to 11.7 million head through December 1, 2018, compared to the same period last year.

Packer demand was driven by strong domestic and international beef demand. Total steer and heifer slaughter through the end of November of 2018 increased 2.1% compared with the first eleven months 2017. Slaughter capacity constraints, primarily due to labor shortages, have limited the packers' ability to increase slaughter rates at the same pace as cattle on feed inventories, resulting in higher packer margins. However, these higher margins should incentivize the packers to increase slaughter capacity, which will be crucial for cattle feeding margins moving forward.

The U.S. looks poised to grow its global market share for animal protein while Australia continues to struggle with drought conditions, and Asian swine flu issues in China should result in larger world export demand for animal protein from the U.S.

Year-to-date U.S. distillers grains exports through November 30, 2018, were 11.0 million metric tons, or 8.8% higher than the same period last year, according to the USDA Foreign Agriculture Service. Shipments of distillers grains to Southeast Asia increased 76% year over year due to growing demand for protein, which helped keep export volumes in line with last year. Mexico, South Korea, Vietnam, Turkey, Thailand and Indonesia, accounted for approximately 61% of total U.S. distillers export volumes.

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. Congress may also consider legislation that would impact the RFS. Bills have been introduced in the House and Senate, which would either eliminate the RFS entirely or eliminate the corn based ethanol portion of the mandate, though they have failed to gain traction heretofore.

Federal mandates supporting the use of renewable fuels are a significant driver of ethanol demand in the U.S. Ethanol policies are influenced by environmental concerns, diversifying our fuel supply, and an interest in reducing the country's dependence on foreign oil. Consumer acceptance of flex-fuel vehicles and higher ethanol blends of ethanol in non-flex-fuel vehicles may be necessary before ethanol can achieve significant growth in U.S. market share. CAFE, which was first enacted by Congress in 1975 to reduce energy consumption by increasing the fuel economy of cars and light trucks, provides a 54% efficiency bonus to flexible-fuel vehicles running on E85. Another important factor is a waiver in the Clean Air Act, known as the One-Pound Waiver, which allows E10 to be sold year-round, even though it exceeds the Reid Vapor Pressure limitation of nine pounds per square inch. However, the One-Pound Waiver does not currently apply to E15 or higher blends, even though it has similar physical properties to E10, so its sale is limited to flex-fuel vehicles only during the June 1 to September 15 summer driving season.

On October 8, 2018, President Trump directed the EPA to begin rulemaking to expand the One-Pound Waiver to E15 so it can be sold year round. The EPA will follow the Administrative Procedure Act in proposing a rule, accepting public comment, and then issuing a final rule. The President has stated a goal of having a final rule out before the start of summer driving season on June 1, 2019. Any final rule from the agency is susceptible to legal challenges. A government shutdown or staffing shortfalls could delay a final rule.

When the RFS II was passed in 2007 and rulemaking finalized in October 2010, the required volume of conventional renewable fuel to be blended with gasoline was to increase each year until it reached 15.0 billion gallons in 2015. In November 2018, the EPA announced it would maintain the 15.0 billion gallon mandate for conventional ethanol in 2019.

The EPA has the authority to waive the mandates in whole or in part if there is inadequate domestic renewable fuel supply or the requirement severely harms the economy or environment. According to the RFS II, 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. While conventional ethanol maintained 15 billion gallons, 2019 is the second year that the total proposed RVOs are more than 20% below statutory volumes levels. Thus, the EPA Administrator has directed his staff to initiate a reset rulemaking, wherein the EPA will modify statutory volumes through 2022, based on the same factors used to set the RVOs post-2022. These factors, detailed in 42 U.S.C. 7545(o)(2)(B)(ii), are environmental impact, domestic energy security, expected production, infrastructure impact, consumer costs, job creation, price of ag commodities, food prices, and rural economic development.

The EPA assigns individual refiners, blenders, and importers the volume of renewable fuels they are obligated to use based on their percentage of total domestic transportation fuel sales. Obligated parties use RINs to show compliance with RFS-mandated volumes. RINs are attached to renewable fuels by producers and detached when the renewable fuel is blended with transportation fuel or traded in the open market. The market price of detached RINs affects the price of ethanol in certain markets and influences the purchasing decisions by obligated parties.

The EPA can, in consultation with the Department of Energy, waive the obligation for individual refineries that are suffering “disproportionate economic hardship” due to compliance with the RFS. To qualify, the refineries must be under 75,000 barrels per day and state their case for an exemption in an application to the EPA each year.

The Trump administration waived the obligation for 19 of 20 applicants for compliance year 2016, totaling 790 million gallons, and 29 of 33 for compliance year 2017, totaling 1.46 billion gallons. This effectively reduces the

annual RVO by that amount, since the waived gallons are not reallocated to other obligated parties at this time. The resulting surplus of RINs in the market has brought values down significantly, from the mid \$0.80 range early in the year to under \$0.20. Since the RIN value helps to make higher blends of ethanol more cost effective, lower RIN values could negatively impact retailer and consumer adoption of E15 and higher blends.

Biofuels groups have filed a lawsuit in the U.S. Federal District Court for the D.C. Circuit, challenging the 2019 RVO rule over the EPA's failure to address small refinery exemptions in the rulemaking. This is the first RFS rulemaking since the expanded use of the exemptions came to light, however the EPA has refused to cap the number of waivers it grants or how it accounts for the retroactive waivers in its percentage standard calculations. The EPA has a statutory mandate to ensure the volume requirements are met, which are achieved by setting the percentage standards for obligated parties. The current approach accomplishes the opposite. Even if all the obligated parties comply with their respective percentage obligations for 2019, the nation's overall supply of renewable fuel will not meet the total volume requirements set by the EPA. This undermines Congressional intent of demand pressure creation and an increased consumption of renewable fuels. Biofuels groups argue the EPA must therefore adjust its percentage standard calculations to make up for past retroactive waivers and adjust the standards to account for any waivers it reasonably expects to grant in the future.

On July 28, 2017, the U.S. Federal District Court for the D.C. Circuit ruled in favor of the Americans for Clean Energy and its petitioners against the EPA related to its decision to lower the 2016 volume requirements. The Court concluded the EPA erred in how it interpreted the "inadequate domestic supply" waiver provision of RFS II, which authorizes the EPA to consider supply-side factors affecting the volume of renewable fuel available to refiners, blenders and importers to meet statutory volume requirements. The waiver provision does not allow the EPA to consider the volume of renewable fuel available to consumers or the demand-side constraints that affect the consumption of renewable fuel by consumers. As a result, the Court vacated the EPA's decision to reduce the total renewable fuel volume requirements for 2016 through its waiver authority, which the EPA is expected to address. We believe this decision to confine the EPA's waiver analysis to supply considerations benefits the industry overall and expect the primary impact will be on the RINs market. The EPA has

not yet accounted for the 500 million gallons that the court in the Americans for Clean Energy case directed, though they have indicated they will include it in the reset rulemaking.

Government actions abroad can significantly impact the demand for U.S. ethanol. In September 2017, China's National Development and Reform Commission, the National Energy Board and 15 other state departments issued a joint plan to expand the use and production of biofuels containing up to 10% ethanol by 2020. China, the number three importer of U.S. ethanol in 2016, imported negligible volumes during the year due to a 30% tariff imposed on U.S. and Brazil fuel ethanol, which took effect in January 2017. There is no assurance the recently issued joint plan will lead to increased imports of U.S. ethanol, and recent trade tensions have caused China to raise their tariff on ethanol to 45% and then to 70%. Our exports also face tariff rate quotas, countervailing duties, and other hurdles in Brazil, the European Union, India, Peru, and elsewhere, which limits our ability to compete in some markets.

In Brazil, the Secretary of Foreign Trade issued an official written resolution, imposing a 20% tariff on U.S. ethanol imports in excess of 150 million liters, or 39.6 million gallons per quarter in September 2017. The ruling is valid for two years. In June 2017, the Energy Regulatory Commission of Mexico (CRE) approved the use of 10% ethanol blends, which was challenged by nine lawsuits. Four cases were dismissed. The five remaining cases follow one of two tracks: 1) to determine the constitutionality of the CRE regulation, or 2) to determine the benefits, or lack thereof, of introducing E10 to Mexico. Five of these cases were initially denied and are going through the appeals process. An injunction was granted in October 2017, preventing the blending and selling of E10, but was overturned by a higher court in June 2018 making it legal to blend and sell E10 by PEMEX throughout Mexico except for its three largest metropolitan areas. U.S. ethanol exports to Mexico totaled 27.6 mmg for the eleven months ended November 30, 2018.

The Tax Cuts and Jobs Act was enacted on December 22, 2017 and is effective January 1, 2018. Among other provisions, the new law reduced the federal statutory corporate income tax rate from 35% to 21%. We have completed our analysis of the Act's impact and have included the tax impacts in our financial statements.

Environmental and Other Regulation

Our operations are subject to environmental regulations, including those that govern the handling and release of ethanol, crude oil and other liquid hydrocarbon materials. Compliance with existing and anticipated environmental laws and regulations may increase our overall cost of doing business, including capital costs to construct, maintain, operate, and upgrade equipment and facilities. Our business may also be impacted by government policies, such as tariffs, duties, subsidies, import and export restrictions and outright embargos. We employ maintenance and operations personnel at each of its facilities, which are regulated by the Occupational Safety and Health

Administration.

The U.S. ethanol industry relies heavily on tank cars to deliver its product to market. On May 1, 2015, the DOT finalized the Enhanced Tank Car Standard and Operational Controls for High-Hazard and Flammable Trains, or DOT specification 117, which established a schedule to retrofit or replace older tank cars that carry crude oil and ethanol, braking standards intended to reduce the severity of accidents and new operational protocols. The deadline for compliance with DOT specification 117 is May 1, 2023. The rule may increase our lease costs for railcars over the long term. Additionally, existing railcars may be out of service for a period of time while upgrades are made, tightening supply in an industry that is highly dependent on railcars to transport product. We intend to strategically manage our leased railcar fleet to comply with the new regulations and have commenced transition of our fleet to DOT 117 compliant railcars. As of December 31, 2018, approximately 20% of our railcar fleet was DOT 117 compliant. We anticipate that an additional 20% of our railcar fleet will be DOT 117 compliant by the end of 2019, and that our entire fleet will be fully compliant by 2023.

In September 2015, the FDA issued rules for Current Good Manufacturing Practice, Hazard Analysis and Risk-Based Preventative Controls for food for animals in response to FSMA. The rules require FDA-registered food facilities to address safety concerns for sourcing, manufacturing and shipping food products and food for animals through food safety programs that include conducting hazard analyses, developing risk-based preventative controls and monitoring, and addressing intentional adulteration, recalls, sanitary transportation and supplier verification. We believe we have taken sufficient measures to comply with these regulations.

On January 1, 2017, all medically important antimicrobials intended for use in animal feed that were once available over-the-counter became veterinary feed directive drugs, requiring written orders from a licensed veterinarian to purchase and use in livestock feed under the October 2015 revised Veterinary Feed Directive rule. Our cattle feeding operations obtained all necessary prescriptions from a licensed veterinarian to use certain veterinary feed directive drugs, as appropriate.

Variability of Commodity Prices

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

During periods of commodity price variability or compressed margins, we may reduce or cease operations at certain ethanol plants. Slowing down production increases the ethanol yield per bushel of corn, optimizing cash flow in lower margin environments. In 2018, our ethanol facilities ran at approximately 75% of our daily average capacity, largely due to the low margin environment during the year driven by higher domestic ethanol supplies resulting from weak refiner and blender input volume.

Critical Accounting Policies and Estimates

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

Revenue Recognition

We recognize revenue at the point in time when the product or service is transferred to the customer.

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 we control the product prior to the sale to the end customer, take title of the product and have inventory risk. Unearned revenue is recorded for goods in transit when we have 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.

We routinely enter into physical-delivery energy commodity purchase and sale agreements. At times, we settle these transactions by transferring obligations to other counterparties rather than delivering the physical commodity. Energy trading transactions are reported net as a component of revenue. 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, cattle and vinegar, 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 when 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.

Intercompany revenues are eliminated on a consolidated basis for reporting purposes.

Depreciation of Property and Equipment

Property and equipment are stated at cost less accumulated depreciation. Depreciation on our ethanol production and grain storage facilities, railroad tracks, computer equipment and software, office furniture and equipment, vehicles, and other fixed assets is provided using the straight-line method over the estimated useful life of the asset, which currently ranges from 3 to 40 years.

Land improvements are capitalized and depreciated. Expenditures for property betterments and renewals are capitalized. Costs of repairs and maintenance are charged to expense when incurred.

We periodically evaluate whether events and circumstances have occurred that warrant a revision of the estimated useful life of the asset, which is accounted for prospectively.

Carrying Value of Intangible Assets

Our intangible assets consist of research and development technology and licenses that were capitalized at their fair value at the time of consolidation of BioProcess Algae, and are being amortized over their estimated useful lives.

Impairment of Long-Lived Assets and Goodwill

Our long-lived assets consist of property and equipment, intangible assets and equity method investments. We review long-lived assets for impairment whenever events or changes in circumstances indicate the carrying amount of the asset may not be recoverable. We measure recoverability by comparing the carrying amount of the asset with the estimated undiscounted future cash flows the asset is expected to generate. If the carrying amount of the asset exceeds its estimated future cash flows, we record an impairment charge for the amount in excess of the fair value. There were no material impairment charges recorded for the periods reported.

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

circumstances indicate that an impairment may have occurred.

Effective January 1, 2018, we early adopted the amended guidance in ASC Topic 350, Intangibles – Goodwill and Other: Simplifying the Test for Goodwill Impairment, which simplifies the measurement of goodwill by eliminating Step 2 from the goodwill impairment test. Under the amended guidance, an entity may first assess qualitative factors to determine whether it is necessary to perform a quantitative goodwill impairment test. If determined to be necessary, the quantitative impairment test shall be used to identify goodwill impairment and measure the amount of a goodwill impairment loss to be recognized (if any).

We performed our annual goodwill assessment as of October 1, 2018, using a qualitative assessment, which resulted in no goodwill impairment.

We estimate the amount and timing of projected cash flows that will be generated by an asset over an extended period of time when we review our long-lived assets and goodwill. Circumstances that may indicate impairment include: a decline in future projected cash flows, a decision to suspend plant operations for an extended period of time, a sustained decline in our market capitalization, a sustained decline in market prices for similar assets or businesses or a significant adverse change in legal or regulatory matters, or business climate. Significant management judgment is required to determine the fair value of our long-lived assets and goodwill and measure impairment, including projected cash flows. Fair value is determined through various valuation techniques, including discounted cash flow models utilizing assumed margins, cost of capital, inflation and other inputs, sales of comparable properties and third-party independent appraisals. Changes in estimated fair value as a result of declining ethanol margins, loss of significant customers or other factors could result in a write-down of the asset.

Derivative Financial Instruments

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

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

We evaluate our 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 we elect, cash flow hedge accounting treatment.

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

At times, we hedge our exposure to changes in inventory values and designate qualifying derivatives as fair value hedges. The carrying amount of the hedged inventory is adjusted in the current period for changes in fair value. 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.

Accounting for Income Taxes

Income taxes are accounted for under the asset and liability method in accordance with GAAP. Deferred tax assets and liabilities are recognized for future tax consequences between existing assets and liabilities and their respective tax basis, and for net operating loss and tax credit carry-forwards. Deferred tax assets and liabilities are measured using enacted tax rates expected to be applied to taxable income in years temporary differences are expected to be recovered or settled. The effect of a tax rate change is recognized in the period that includes the enactment date. The realization of deferred tax assets depends on the generation of future taxable income during the periods in which temporary differences become deductible. Management considers scheduled reversal of deferred tax liabilities,

projected future taxable income and tax planning strategies to make this assessment. Management considers the positive and negative evidence to support the need for, or reversal of, a valuation allowance. The weight given to the potential effects of positive and negative evidence is based on the extent it can be objectively verified.

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

Recently Issued Accounting Pronouncements

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

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements other than the operating leases, which are entered into during the ordinary course of business and disclosed in the Contractual Obligations section below.

Components of Revenues and Expenses

Revenues. For our ethanol production segment, our revenues are derived primarily from the sale of ethanol, distillers grains and corn oil. For our agribusiness and energy services segment, sales of ethanol, distillers grains and corn oil that we market for our ethanol plants, and earn a marketing fee, sales of ethanol we market for a third-party and sales of grain and other commodities purchased in the open market represent our primary sources of revenue. For our food and ingredients segment, the sale of cattle, and vinegar prior to the sale of Fleischmann's Vinegar during the fourth quarter of 2018, are our

primary sources of revenue. For our partnership segment, our revenues consist primarily of fees for receiving, storing, transferring and transporting ethanol and other fuels. Revenues include net gains or losses from derivatives related to products sold.

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

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

For our food and ingredients segment, the cattle feeding operations includes costs of cattle, feed and veterinary supplies, direct labor and feedlot overhead, which are accumulated as inventory and included as a component of cost of goods sold when the cattle are sold. Direct labor includes compensation and related benefits of non-management personnel involved in the feedlot operations. Feedlot overhead costs include feedlot utilities, repairs and maintenance and yard expenses. For our vinegar operation, which was sold during the fourth quarter of 2018, cost of goods sold included direct labor, materials and plant overhead costs. Direct labor included compensation and related benefits of non-management personnel involved in vinegar operations. Overhead consisted primarily of plant utilities and outbound freight charges. Food-grade ethanol was the most significant raw material cost.

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

Selling, General and Administrative Expense. Selling, general and administrative expenses are recognized at the operating segment and corporate level. These expenses consist of employee salaries, incentives and benefits; office expenses; director fees; and professional fees for accounting, legal, consulting and investor relations services. Personnel costs, which include employee salaries, incentives, and benefits, as well as severance and separation costs,

are the largest expenditure. Selling, general and administrative expenses that cannot be allocated to an operating segment are referred to as corporate activities.

Gain on Sale of Assets, Net. The company completed the sale of the three ethanol plants located in Bluffton, Indiana, Lakota, Iowa and Riga, Michigan, as well as Fleischmann's Vinegar during the fourth quarter of 2018. Proceeds from these sales, offset by related expenses, were recorded primarily at the corporate level, with only the gain on the assignment of operating leases of \$2.7 million being recorded at the partnership level.

Other Income (Expense). Other income (expense) includes interest earned, interest expense, equity earnings in nonconsolidated subsidiaries and other non-operating items.

Results of Operations

Comparability

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

- April 2016 Increased ownership of BioProcess Algae and began consolidating within our consolidated financial statements.
- September 2016 Madison, Illinois, Mount Vernon, Indiana, and York, Nebraska ethanol plants were acquired and the partnership acquired certain storage assets of these plants.
- October 2016 Fleischmann's Vinegar was acquired.
- March 2017 Hereford, Texas cattle feeding operation was acquired.
- May 2017 Leoti, Kansas and Eckley, Colorado cattle feeding operations were acquired.
- August 2018 Sublette, Kansas and Tulia, Texas cattle feeding operations were acquired.
- November 2018 Bluffton, Indiana, Lakota, Iowa and Riga, Michigan ethanol plants were sold and certain storage assets of these plants were acquired from the partnership prior to being sold.
- November 2018 Hopewell, Virginia ethanol plant was permanently closed.
- November 2018 Fleischmann's Vinegar was sold.

The year ended December 31, 2016, includes approximately nine months of consolidated operations of BioProcess Algae, and approximately three months of operations at the Madison, Mount Vernon, and York ethanol plants and Fleischmann's Vinegar. The year ended December 31, 2017, includes approximately nine months of operations at our Hereford cattle feeding business and six months of operations at our Leoti and Eckley cattle feeding operations. The year ended December 31, 2018, includes approximately five months of operations at our Sublette and Tulia cattle feeding businesses, eleven months of operations at our Bluffton, Lakota, Hopewell and Riga ethanol plants and eleven months of our Fleischmann's Vinegar operations.

Segment Results

We report the financial and operating performance for the following four operating segments: (1) ethanol production, which includes the production of ethanol, distillers grains 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, (3) food and ingredients, which includes cattle feeding and food-grade corn oil operations and included vinegar production until the sale of Fleischmann's Vinegar during the fourth quarter of 2018 and (4) partnership, which includes fuel storage and transportation services.

During the normal course of business, our operating segments do business with each other. For example, our agribusiness and energy services segment procures grain and natural gas and sells products, including ethanol, distillers grains and 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 gain on sale of assets, net recorded during the fourth quarter of 2018. When we evaluate segment performance, we review the following segment information as well as earnings before interest, income taxes, depreciation and amortization, or EBITDA.

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

	Year Ended December 31,		
	2018	2017	2016
Revenues:			
Ethanol production:			
Revenues from external customers (1)	\$ 2,109,079	\$ 2,497,360	\$ 2,409,102
Intersegment revenues	11,582	10,313	-
Total segment revenues	2,120,661	2,507,673	2,409,102
Agribusiness and energy services:			
Revenues from external customers (1)	722,756	621,223	675,446
Intersegment revenues	46,200	47,538	34,461
Total segment revenues	768,956	668,761	709,907
Food and ingredients:			
Revenues from external customers (1)	1,005,037	471,398	318,031
Intersegment revenues	156	383	150
Total segment revenues	1,005,193	471,781	318,181
Partnership:			
Revenues from external customers	6,481	6,185	8,302
Intersegment revenues	94,267	100,808	95,470
Total segment revenues	100,748	106,993	103,772
Revenues including intersegment activity	3,995,558	3,755,208	3,540,962
Intersegment eliminations	(152,205)	(159,042)	(130,081)
Revenues as reported	\$ 3,843,353	\$ 3,596,166	\$ 3,410,881

(1) Revenues from external customers include realized gains and losses from derivative financial instruments.

	Year Ended December 31,		
	2018	2017	2016
Cost of goods sold:			
Ethanol production	\$ 2,118,787	\$ 2,434,001	\$ 2,280,906
Agribusiness and energy services	717,772	614,582	650,538
Food and ingredients	939,838	411,781	294,396
Partnership	-	-	-
Intersegment eliminations	(148,764)	(158,777)	(129,761)
	\$ 3,627,633	\$ 3,301,587	\$ 3,096,079

	Year Ended December 31,		
	2018	2017	2016
Operating income (loss):			
Ethanol production	\$ (111,823)	\$ (45,074)	\$ 28,125
Agribusiness and energy services	29,076	30,443	34,039
Food and ingredients	40,130	35,961	16,436
Partnership	64,770	65,709	60,903
Intersegment eliminations	(3,110)	(61)	(170)
Corporate activities	96,687	(45,232)	(47,645)
	\$ 115,730	\$ 41,746	\$ 91,688

	Year Ended December 31,		
	2018	2017	2016
EBITDA:			
Ethanol production	\$ (31,623)	\$ 40,069	\$ 97,113
Agribusiness and energy services	31,583	33,906	34,209
Food and ingredients	55,805	49,803	20,190
Partnership	69,399	71,041	66,633
Intersegment eliminations	(3,110)	(61)	(732)
Corporate activities	102,598	(40,388)	(42,985)
	\$ 224,652	\$ 154,370	\$ 174,428

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

	Year Ended December 31,	
	2018	2017
Total assets:		
Ethanol production	\$ 872,845	\$ 1,144,459
Agribusiness and energy services	399,633	554,981
Food and ingredients	552,459	725,232
Partnership	67,297	74,935
Corporate assets	334,236	295,217
Intersegment eliminations	(10,038)	(10,174)
	\$ 2,216,432	\$ 2,784,650

Year Ended December 31, 2018 Compared with the Year Ended December 31, 2017

Consolidated Results

Consolidated revenues increased \$247.2 million in 2018, compared with 2017, primarily as a result of the acquisitions of cattle feeding operations during the first and second quarters of 2017 and in the third quarter of 2018. The increase was also driven by higher average realized prices for distillers grains and additional natural gas volumes sold, partially offset by a decrease in volumes for ethanol and distillers grains and lower average realized prices for ethanol and corn oil. The increase was also partially offset by lower revenues as a result of the disposition of three ethanol plants and Fleischmann's Vinegar in November of 2018.

Operating income increased \$74.0 million and EBITDA increased \$70.3 million in 2018, compared with 2017 primarily due to gain on the sale of assets related to the sale of three ethanol plants and Fleischmann's Vinegar during the fourth quarter, which resulted in a net gain of \$150.4 million. This increase was partially offset by decreased margins in our ethanol production segment. Interest expense increased \$10.9 million in 2018, compared with 2017 primarily due to the \$13.2 million write-off of deferred debt issuance costs related to repayment of the \$500 million senior secured term loan due 2023, as well as higher average debt borrowings and higher borrowing costs

during the year, partially offset by lower expense associated with termination of previous credit facilities during the fourth quarter of 2018. Income tax benefit was \$16.7 million in 2018, compared to \$124.8 million in 2017. The benefit reflected in 2018 is primarily due to the company's recognition of tax benefits related to the completion of the 2017 study for R&D credits and an estimate for 2018, as well as the effect of a lower tax rate on pre-tax income. The benefit reflected in 2017 is due to the company's recognition of tax benefits related to enactment of the Tax Cuts and Jobs Act and for the completion of a multi-year study for R&D Credits in 2017, as well as pre-tax losses at a higher tax rate.

The following discussion provides greater detail about our segment performance.

Ethanol Production Segment

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

	Year Ended December	
	31,	2017
	2018	
Ethanol sold (thousands of gallons)	1,086,633	1,256,361
Distillers grains sold (thousands of equivalent dried tons)	2,815	3,314
Corn oil sold (thousands of pounds)	276,299	301,920
Corn consumed (thousands of bushels)	377,084	437,373

Revenues in the ethanol production segment decreased \$387.0 million in 2018 compared with 2017 primarily due to lower volumes of ethanol and distillers grains sold in addition to lower average ethanol and corn oil prices realized, partially offset by higher average distillers grains prices realized.

Cost of goods sold in the ethanol production segment decreased \$315.2 million for 2018 compared with 2017 due to lower production volumes. As a result of the factors identified above, operating income decreased \$66.7 million and EBITDA decreased \$71.7 million during 2018. Depreciation and amortization expense for the ethanol production segment was \$80.2 million for 2018, compared with \$82.0 million during 2017 due to the sale of the three ethanol plants.

Agribusiness and Energy Services Segment

Revenues in the agribusiness and energy services segment increased \$100.2 million while operating income decreased \$1.4 million and EBITDA decreased \$2.3 million in 2018 compared with 2017. The increase in revenues was primarily due to an increase in natural gas and ethanol trading activity, partially offset by lower average realized prices for corn oil. Operating income and EBITDA decreased primarily as a result of decreased trading activity margins.

Food and Ingredients Segment

Revenues in our food and ingredients segment increased \$533.4 million in 2018 compared with 2017. The increase in revenues was primarily due to an increase in cattle volumes sold as a result of the acquisitions of cattle feeding operations during the first and second quarters of 2017 and in the third quarter of 2018. Cattle head sold during fiscal year 2018 and 2017, was approximately 547,600 and 199,500, respectively.

Operating income increased by \$4.2 million and EBITDA increased \$6.0 million during 2018, compared with 2017 primarily due to the increase in cattle volumes outlined above.

In addition, during 2018, the company recognized a gain within other income of \$4.5 million related to business interruption and property insurance proceeds received in excess of the book value of certain fixed assets that were damaged at the Hereford cattle feed yard.

Partnership Segment

Revenues generated from the partnership segment decreased \$6.2 million in 2018 compared with 2017. Revenues generated from rail transportation services decreased \$3.9 million due to lower average rates charged for the railcar volumetric capacity provided, as well as the reduction in volumetric capacity associated with the assignment of railcar operating leases to Valero in the fourth quarter of 2018. Storage and throughput revenue decreased \$3.2 million primarily due to a decrease in throughput volumes which was driven by lower capacity utilization, as well as the sale of the Bluffton, Indiana, Lakota, Iowa, and Riga Michigan ethanol plants. Revenues generated from terminal services decreased \$0.8 million due to reduced throughput at our fuel terminals. These decreases were partially offset by an increase in trucking and other revenue of \$1.6 million due to expansion of our truck fleet.

General and administrative expenses increased \$1.0 million in 2018 compared with 2017 primarily due to higher transaction costs and professional fees, as well as an increase in expenses allocated to the partnership under the secondment agreement.

Operating income for the partnership segment decreased \$0.9 million while EBITDA decreased \$1.6 million in 2018 compared to 2017 due to the changes in revenues discussed above, partially offset by a decrease in operations and maintenance expenses of \$2.6 million as a result of the factors identified above.

Intersegment Eliminations

Intersegment eliminations of revenues decreased by \$6.8 million for 2018 compared with 2017, primarily due to a decrease in storage and throughput fees paid to the partnership as a result of the sale of three ethanol plants in November 2018.

Corporate Activities

Operating income was impacted by a decrease in operating expenses for corporate activities of \$141.9 million for 2018 compared with 2017, primarily due to the gain on sale of assets recorded during the fourth quarter of 2018.

Income Taxes

We recorded income tax benefit of \$16.7 million for 2018 compared to \$124.8 million in 2017. The benefit reflected in 2018 is primarily due to the company's recognition of tax benefits related to the completion of the 2017 study for R&D credits and an estimate for 2018, as well as the effect of a lower tax rate on pre-tax income. The benefit reflected in 2017 is primarily due to the company's recognition of tax benefits related to enactment of the Tax Cuts and Jobs Act and for the completion of a multi-year study for R&D Credits in 2017, as well as pre-tax losses at a higher tax rate.

The effective tax rate (calculated as the ratio of income tax expense to income before income taxes) was approximately (83.6)% for 2018 compared with 289.2% for 2017.

Year Ended December 31, 2017 Compared with the Year Ended December 31, 2016

Consolidated Results

Consolidated revenues increased \$185.3 million in 2017, compared with 2016. Revenues were impacted by the acquisition of the Madison, Mount Vernon and York ethanol plants and Fleischmann's Vinegar during the third and fourth quarters of 2016, respectively, and cattle feeding operations during the first and second quarters of 2017, plus an increase in ethanol and corn oil volumes sold. This was partially offset by a decrease in grain trading activity volumes and lower average realized prices for ethanol, grain and distillers grains.

Operating income decreased \$49.9 million in 2017, compared with 2016 primarily due to a decrease in ethanol margins as well as a decrease in grain trading volume and price, partially offset by the acquisitions of Fleischmann's Vinegar and the cattle feeding operations. EBITDA decreased \$20.1 million in 2017 due to decreased ethanol margins as well as decreased grain trading volume and price, partially offset by the acquisitions of Fleischmann's Vinegar and the cattle feeding operations. Interest expense increased \$38.3 million in 2017, compared with 2016 primarily due to higher average debt outstanding and borrowing costs, \$12.3 million in expense associated with the termination of previous credit facilities, and a \$1.3 million charge related to the extinguishment of a portion of the 3.25% convertible notes. Income tax benefit was \$124.8 million in 2017, compared with income tax expense of \$7.9 million in 2016 primarily due to the company's recognition of tax benefits related to enactment of the Tax Cuts and Jobs Act and Research and Development credits, or R&D Credits.

The following discussion provides greater detail about our segment performance.

Ethanol Production Segment

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

	Year Ended December 31,	
	2017	2016
Ethanol sold (thousands of gallons)	1,256,361	1,147,630
Distillers grains sold (thousands of equivalent dried tons)	3,314	3,064
Corn oil sold (thousands of pounds)	301,920	273,901
Corn consumed (thousands of bushels)	437,373	401,065

Revenues in the ethanol production segment increased \$98.6 million in 2017 compared with 2016 primarily due to higher volumes of ethanol, distillers grains and corn oil produced, primarily due to the acquisition of the Madison, Mount Vernon and York ethanol plants.

Cost of goods sold in the ethanol production segment increased \$153.1 million for 2017 compared with 2016 due to higher production volumes associated with the acquisition of the Madison, Mount Vernon and York ethanol plants and increased prices. Operating income for the ethanol production segment decreased \$73.2 million for 2017 as a result of the factors identified above, as well as additional general and administrative expenses due to the additional ethanol plants acquired. EBITDA decreased \$57.0 million for 2017, compared to 2016 due to decreased margins in ethanol production. Depreciation and amortization expense for the ethanol production segment was \$82.0 million for 2017, compared with \$68.7 million during 2016.

Agribusiness and Energy Services Segment

Revenues in the agribusiness and energy services segment decreased \$41.1 million and operating income decreased \$3.6 million in 2017 compared with 2016. The decrease in revenues was primarily due to a decrease in grain trading volumes, partially offset by increased intersegment distillers grain, marketing and corn revenues. The decrease in operating income was the result of lower margins on merchant trading activity, partially offset by increased intersegment marketing and corn origination fees. EBITDA decreased \$0.3 million for 2017, compared to 2016 due to decreased trading volume.

Food and Ingredients Segment

Revenues in our food and ingredients segment increased \$153.6 million in 2017 compared with 2016. The increase in revenues was primarily due to the acquisitions of Fleischmann's Vinegar and the cattle feeding operations. The daily average company-owned cattle on feed for the years ended December 31, 2017 and 2016 was approximately 130,000 and 65,000 head, respectively, and the daily average third-party owned cattle on feed for the years ended December 31, 2017 and 2016 was approximately 46,000 and 1,400, respectively.

Operating income for the food and ingredients segment increased \$19.5 million in 2017 compared with 2016, primarily due to an increase in cattle volumes due to the acquisition of the cattle feeding operations in the first and second quarters of 2017, as well as Fleischmann's Vinegar being included for the entire year. EBITDA for the food and ingredients segment increased by \$29.6 million in 2017 compared with 2016, primarily due to an increase in cattle margins, as well as the acquisition of Fleischmann's Vinegar.

Partnership Segment

Revenues generated from the partnership segment increased \$3.2 million for the year ended December 31, 2017 as compared to the year ended December 31, 2016. Revenues generated from the partnership's storage and throughput agreement increased \$4.6 million primarily due to higher throughput volumes related to ethanol storage assets acquired in September 2016. Other revenue increased \$0.6 million primarily due to the expansion of the partnership's truck fleet. These increases were partially offset by revenues generated from the partnership's rail transportation services agreement with Green Plains Trade, which decreased \$1.4 million due to lower average rates charged for the railcar volumetric capacity provided, and revenues generated from the partnership's terminal services agreements, which decreased \$0.6 million due to lower biodiesel throughput volumes at our terminals.

General and administrative expenses decreased \$0.2 million in 2017 compared with 2016 primarily due to a decrease in transaction costs associated with the acquisition of ethanol storage assets in 2016.

Operating income for the partnership segment increased \$4.8 million in 2017 compared to 2016 due to the changes in revenues discussed above, as well as a decrease in operations and maintenance expenses of \$0.7 million for 2017. EBITDA increased \$4.4 million for 2017 compared with 2016 due to the increased storage and throughput revenues, as well as a decrease in operations and maintenance expenses of \$0.7 million for 2017 compared with 2016.

Intersegment Eliminations

Intersegment eliminations of revenues increased by \$29.0 million for 2017 compared with 2016, due to increased intersegment distillers grain and corn revenues paid to the ethanol production and agribusiness and energy services segments and the increase in storage and throughput fees paid to the partnership segment. Intersegment eliminations of operating income remained relatively unchanged in 2017 compared with 2016.

Corporate Activities

Operating income was impacted by a decrease in operating expenses for corporate activities of \$2.4 million for 2017 compared with 2016, primarily due to decreases in selling, general and administrative expenses largely driven by acquisition costs incurred in 2016.

Income Taxes

We recorded income tax benefit of \$124.8 million for 2017 compared with income tax expense of \$7.9 million in 2016. The change in income taxes was primarily due to the company's recognition of tax benefits related to recently enacted Tax Cuts and Jobs Act and R&D Credits. The effective tax rate (calculated as the ratio of income tax expense to income before income taxes) was approximately 289.2% for 2017 compared with 20.5% for 2016.

A study was conducted to determine whether certain activities the company performs qualify for the R&D Credit allowed by the Internal Revenue Code Section 41. As a result of this study, the company concluded these activities do qualify for the credit and determined it was appropriate to claim the benefit of these credits for all open tax years. The company recognized these credits during the second half of 2017, along with an estimate of the credit for qualified activities year-to-date. The company will continue to evaluate eligibility for R&D Credits on a regular basis.

Liquidity and Capital Resources

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

On December 31, 2018, we had \$251.7 million in cash and equivalents, excluding restricted cash, consisting of \$226.0 million available to our parent company and the remainder at our subsidiaries. Additionally, we had \$66.5 million in restricted cash at December 31, 2018. We also had \$467.0 million available under our revolving credit agreements, some of which were subject to restrictions or other lending conditions. Funds held by our subsidiaries are generally required for their ongoing operational needs and restricted from distribution. At December 31, 2018, our subsidiaries had approximately \$243.4 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 provided by operating activities was \$39.0 million in 2018 compared with net cash used in operating activities of \$182.2 million in 2017. Operating activities compared to the prior year were primarily affected by a decrease in the year over year change in inventories as well as decreases in deferred and current income taxes, offset by the gain on sale of assets recognized in 2018. Net cash provided by investing activities was \$507.5 million in 2018, compared to net cash used in investing activities of \$128.5 million in 2017, due primarily to the proceeds from the sale of the three ethanol plants and Fleischmann's Vinegar partially offset by the acquisition of additional cattle feeding operations. Net cash used in financing activities was \$540.6 million in 2018 primarily due to the repayment of the term loan.

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

We incurred capital expenditures of \$44.2 million in 2018 for projects, including expansion projects of approximately \$27.3 million for ethanol production capacity and \$6.4 million for cattle capacity and various other projects. The current projected estimate for capital spending for 2019 is approximately \$50 million, which is subject to review prior to the initiation of any project. The budget includes additional expenditures for expansion projects at our operations, investments in joint ventures, as well as expenditures for various other maintenance projects, and is expected to be financed with available borrowings under our credit facilities and cash provided by operating activities.

Our business is highly sensitive to the price of commodities, particularly for corn, ethanol, distillers grains, corn oil, natural gas and cattle. 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. On December 31, 2018, we had \$42.2 million in margin deposits for broker margin requirements. 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.

We have paid a quarterly cash dividend since August 2013 and anticipate declaring a cash dividend in future quarters on a regular basis. Future declarations of dividends, however, are subject to board approval and may be adjusted as our liquidity, business needs or market conditions change. On February 6, 2019, our board of directors declared a quarterly cash dividend of \$0.12 per share. The dividend is payable on March 14, 2019, to shareholders of record at the close of business on February 22, 2019.

In August 2014, we announced a share repurchase program of up to \$100 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. During 2018, we purchased a total of 209,682 shares of common stock for approximately \$3.0 million. To date, we have repurchased 1,119,349 of common stock for approximately \$19.7 million under the program.

On August 25, 2016, the partnership filed a shelf registration statement on Form S-3 with the SEC, declared effective September 2, 2016, registering an indeterminate number of debt and equity securities with a total offering price not to exceed \$500,000,250. The partnership also registered 13,513,500 common units held by Green Plains, consisting of 4,389,642 common units and 9,123,858 common units that could be issued upon conversion of subordinated units. In the fourth quarter of 2018, the partnership retired units received from Green Plains for the sale of storage assets, resulting in 11,586,548 units held by Green Plains that could be sold under the shelf as of December 31, 2018.

The requirements under the partnership agreement for the conversion of all of the outstanding subordinated units into common units were satisfied upon the payment of the distribution with respect to the quarter ended June 30, 2018. Accordingly, the subordination period ended on August 13, 2018, the first business day after the date of the distribution payment, and all of the 15,889,642 outstanding subordinated units were converted into common units on a one-for-one basis. The conversion of the subordinated units does not impact the amount of cash distributions paid or the total number of outstanding units.

We have an effective shelf registration statement on Form S-3 on file with the SEC that was initially filed on December 22, 2016, registering an indeterminate number of shares of common stock, warrants and debt securities up to \$250,000,000.

We believe we have sufficient working capital for our existing operations. Furthermore, our liquidity position was improved as a result of the sale of three of our ethanol plants located in Bluffton, Indiana, Lakota, Iowa, and Riga, Michigan as well as the sale of Fleischmann's Vinegar. The majority of net cash proceeds from the sales, net of fees and taxes, was used to pay off the outstanding term loan balance. A sustained period of unprofitable operations, however, may strain our liquidity making it difficult to maintain compliance with our financing arrangements. We may sell additional assets, equity or borrow capital to improve or preserve our liquidity, expand our business or acquire existing businesses. We cannot provide assurance that we will be able to secure funding necessary for additional working capital or these projects at reasonable terms, if at all.

Debt

We were in compliance with our debt covenants at December 31, 2018. 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.

Corporate Activities

On August 29, 2017, we and substantially all of our subsidiaries, but not including Green Plains Partners and certain other entities as guarantors, entered into a \$500.0 million term loan agreement, which was to mature on August 29, 2023, to refinance approximately \$405.0 million of total debt outstanding issued by Green Plains Processing and Fleischmann's Vinegar, pay associated fees and expenses and for general corporate purposes. In November 2018, we repaid the remaining outstanding balance of our \$500.0 million term loan using a portion of the proceeds from the sales of the three ethanol plants and Fleischmann's Vinegar. We did not incur any early termination penalties to the lenders as a result of the repayment.

In September 2013, we issued \$120.0 million of 3.25% convertible senior notes due in 2018, or 3.25% notes, which were senior, unsecured obligations with interest payable on April 1 and October 1 of each year. Prior to April 1, 2018, the 3.25% notes were not convertible unless certain conditions are satisfied. The conversion rate was subject to adjustment upon the occurrence of certain events, including when the quarterly cash dividend exceeds \$0.04 per share. The conversion rate was recently adjusted as of September 30, 2018, to 50.8753 shares of common stock per \$1,000 of principal, which is equal to a conversion price of approximately \$19.66 per share. We could have settled the 3.25% notes in cash, common stock or a

combination of cash and common stock. For all conversions of notes which occur on or after April 1, 2018, we elected to convert for whole shares of common stock with any fractional share being settled with cash in lieu.

During the second quarter of 2018, an additional 50 shares of our common stock were exchanged for approximately \$1 thousand in aggregate principal amount of the 3.25% notes. Following the closing of this agreement, \$63.7 million aggregate principal amount of the 3.25% notes remained outstanding.

During the three months ended September 30, 2018, we entered into exchange agreements with certain beneficial owners of our outstanding 3.25% convertible senior notes due 2018 (the “Old Notes”), pursuant to which such investors exchanged (the “Exchange”) \$56.8 million in aggregate principal amount of the Old Notes for \$56.8 million in aggregate principal amount of notes due October 1, 2019 (the “New Notes”). We evaluated the Exchange in accordance with ASC 470-50 and concluded that the Exchange qualified as a debt modification as the cash flows and fair value of the embedded conversion option of the New Notes were not substantially different from the Old Notes. As a result, the New Notes were recorded at fair value at the time of the exchange, and the company recorded a non-cash adjustment to additional paid-in capital of \$3.5 million, net of a \$1.2 million tax impact, related to the difference in fair value of the embedded conversion option of the Old Notes and the New Notes. Following the closing of these agreements, \$6.9 million aggregate principal of the Old Notes remained outstanding which was paid on October 1, 2018, the maturity date of the Old Notes.

The New Notes are senior, unsecured obligations of the company and bear interest at a rate of 3.25% per annum, payable semi-annually in arrears on April 1 and October 1 of each year, beginning on October 1, 2018. Interest on the New Notes will accrue from, and including, April 1, 2018. The New Notes will mature on October 1, 2019, unless earlier converted. Holders of New Notes may convert their New Notes, at their option, in integral multiples of \$1,000 principal amount, at any time prior to the close of business on the scheduled trading day immediately preceding the maturity date of the New Notes. The conversion rate for the New Notes will initially be 50.6481 shares of the company’s common stock per \$1,000 principal amount of New Notes, which corresponds to an initial conversion price of approximately \$19.74 per share of the company’s common stock. The conversion rate will be subject to adjustment upon the occurrence of certain events. Upon conversion of the convertible notes, the company will settle its conversion obligation by delivering shares of its common stock at the applicable conversion rate, together with cash in lieu of any fractional share.

We do not have the right to redeem the New Notes at its election before their maturity. The New Notes are subject to customary provisions providing for the acceleration of their principal and interest upon the occurrence of events that constitute an “event of default.” Events of default include, among other events, certain payment defaults, defaults in settling conversions, certain defaults under the company’s other indebtedness and certain insolvency-related events. Upon maturity, we will settle the New Notes in cash.

In August 2016, we issued \$170.0 million of 4.125% convertible senior notes due in 2022, or 4.125% notes, which are senior, unsecured obligations with interest payable on March 1 and September 1 of each year. Prior to March 1, 2022, the 4.125% notes are not convertible unless certain conditions are satisfied. The initial conversion rate is 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 is subject to adjustment upon the occurrence of certain events, including when the quarterly cash dividend exceeds \$0.12 per share. We may settle the 4.125% notes in cash, common stock or a combination of cash and common stock.

Ethanol Production Segment

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

Agribusiness and Energy Services Segment

Green Plains Grain has a \$125.0 million senior secured asset-based revolving credit facility to finance working capital up to the maximum commitment based on eligible collateral, which matures in July of 2019. This facility can be increased by up to \$75.0 million with agent approval and up to \$50.0 million for seasonal borrowings. Total commitments outstanding under the facility cannot exceed \$250.0 million. At December 31, 2018, the outstanding principal balance was \$41.0 million on the facility and the interest rate was 5.53%.

Green Plains Grain has entered into short-term inventory financing agreements with a financial institution. The company has accounted for the agreements as short-term notes, rather than sales, and has elected the fair value option to offset fluctuations in market prices of the inventory. The company had no short-term notes payable related to these inventory financing agreements as of December 31, 2018.

Green Plains Trade has a \$300.0 million senior secured asset-based revolving credit facility to finance working capital up to the maximum commitment based on eligible collateral, which matures in July of 2022. This facility can be increased by up to \$70.0 million with agent approval. Advances are subject to variable interest rates equal to a daily LIBOR rate plus 2.25% or the base rate plus 1.25%. The unused portion of the credit facility is also subject to a commitment fee of 0.375% per annum. At December 31, 2018, the outstanding principal balance was \$108.5 million on the facility and the interest rate was 4.72%.

Green Plains Commodity Management has an uncommitted \$20.0 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 LIBOR plus 1.75%. At December 31, 2018, the outstanding principal balance was \$14.3 million on the facility and the interest rate was 4.16%.

Food and Ingredients Segment

Green Plains Cattle has a \$500.0 million senior secured asset-based revolving credit facility to finance working capital up to the maximum commitment based on eligible collateral, which matures in April of 2020. This facility can be increased by up to \$100.0 million with agent approval and includes a swing-line sublimit of \$20.0 million. On July 31, 2018, the company amended the credit facility, to increase the maximum commitment from \$425.0 million to \$500.0 million. At December 31, 2018, the outstanding principal balance was \$374.5 million on the facility and our interest rate was 4.41%.

Advances under the revolving credit facility, as amended, are subject to variable interest rates equal to LIBOR plus 2.0% to 3.0% or the base rate plus 1.0% to 2.0%, depending on the preceding three months' excess borrowing availability. The unused portion of the credit facility is also subject to a commitment fee of 0.20% to 0.30% per annum, depending on the preceding three months' excess borrowing availability. Interest is payable as required, but not less than quarterly in arrears and principal is due upon maturity.

Partnership Segment

Green Plains Partners, through a wholly owned subsidiary, has a \$200.0 million revolving credit facility, which matures on July 1, 2020, to fund working capital, acquisitions, distributions, capital expenditures and other general partnership purposes. On February 20, 2018, the partnership accessed an additional \$40.0 million to increase the revolving credit facility from \$195.0 million to \$235.0 million. On November 15, 2018, the revolving credit facility available was decreased from \$235.0 million to \$200.0 million. In addition, the lenders permitted the exchange of units as consideration for the transaction and also permitted modifications of various key operating agreements. There were no other significant changes in other covenants. The credit facility can be increased by an additional \$20.0 million without the consent of the lenders. At December 31, 2018, the outstanding principal balance of the facility was \$134.0 million and our interest rate was 5.03%.

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

Contractual Obligations

Contractual obligations as of December 31, 2018 were as follows (in thousands):

Contractual Obligations	Payments Due By Period				
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
Long-term and short-term debt obligations (1)	\$ 925,102	\$ 596,428	\$ 136,225	\$ 172,012	\$ 20,437
Interest and fees on debt obligations (2)	76,254	41,444	19,860	6,935	8,015
Operating lease obligations (3)	90,298	23,552	27,285	10,919	28,542
Other	8,925	1,722	4,033	1,860	1,310
Purchase obligations					
Forward grain purchase contracts (4)	161,378	157,194	2,267	1,917	-
Other commodity purchase contracts (5)	127,905	117,505	7,939	2,461	-
Other	120	79	41	-	-
Total contractual obligations	\$ 1,389,982	\$ 937,924	\$ 197,650	\$ 196,104	\$ 58,304

(1) Includes the current portion of long-term debt and excludes the effect of any debt discounts and issuance costs.

(2) Interest amounts are calculated over the terms of the loans using current interest rates, assuming scheduled principle and interest amounts are paid pursuant to the debt agreements. Includes administrative and/or commitment fees on debt obligations.

(3) Operating lease costs are primarily for railcars and office space.

(4) Purchase contracts represent index-priced and fixed-price contracts. Index purchase contracts are valued at current year-end prices.

(5) Includes fixed-price ethanol, dried distillers grains and natural gas purchase contracts.

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

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

Interest Rate Risk

We are exposed to interest rate risk through our loans which bear interest at variable rates. Interest rates on our variable-rate debt are based on the market rate for the lender's prime rate or LIBOR. A 10% increase in interest rates would affect our interest cost by approximately \$3.2 million per year. At December 31, 2018, we had \$891.2 million in debt, \$672.2 million of which had variable interest rates.

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

Commodity Price Risk

Our business is highly sensitive to commodity price risk, particularly for ethanol, corn, distillers grains, corn oil, natural gas, and cattle. 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. Cattle prices are impacted by weather conditions, overall economic conditions and government regulations and packer processing disruptions.

To reduce the risk associated with fluctuations in the price of ethanol, corn, distillers grains, corn oil, natural gas and cattle, 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

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associated with the derivative instrument during a reporting period when the physical commodity purchases or sale has not yet occurred. For the year ended December 31, 2018, revenues included net losses of \$0.7 million and cost of goods sold included net gains of \$7.9 million associated with derivative instruments.

Ethanol Production Segment

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

Our exposure to market risk, which includes the impact of our risk management activities resulting from our fixed-price purchase and sale contracts and derivatives, is based on the estimated net income effect resulting from a hypothetical 10% change in price for the next 12 months starting on December 31, 2018, are as follows (in thousands):

Commodity	Estimated Total Volume Requirements for the Next 12 Months (1)	Unit of Measure	Net Income Effect of Approximate 10% Change in Price
Ethanol	1,123,000	Gallons	\$ 105,205
Corn	387,000	Bushels	\$ 110,616
Distillers grains	2,900	Tons (2)	\$ 31,849
Corn Oil	292,000	Pounds	\$ 6,145
Natural gas	31,200	MMBTU	\$ 5,067

(1) Estimated volumes reflect anticipated expansion of production capacity at our ethanol plants and assumes production at full capacity.

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

Agribusiness and Energy Services Segment

In the agribusiness and energy services segment, our inventories, physical purchase and sale contracts and derivatives are marked to market. 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.

Our daily net commodity position consists of inventories related to purchase and sale contracts and exchange-traded contracts. The fair value of our position was approximately \$3.5 million for grain at December 31, 2018. Our market risk at that date, based on the estimated net income effect resulting from a hypothetical 10% change in price, was approximately \$0.3 million.

Food and Ingredients Segment

In the food and ingredients segment, our physical cattle purchase and sale contracts and derivatives are marked to market. To reduce commodity price risk caused by market fluctuations for purchase and sale commitments of cattle, we enter into exchange-traded futures and options contracts that serve as hedges.

The market value of exchange-traded futures and options used for hedging are highly correlated with the underlying market value of purchase and sale contracts for cattle. 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.

Our daily net commodity position consists of inventories related to purchase and sale contracts and exchange-traded contracts. The fair value of our position subject to market risk was approximately \$4.6 million for cattle based on market prices at December 31, 2018. Our market risk at that date, based on the estimated net income effect resulting from a hypothetical 10% change in price, was approximately \$0.3 million.

Our daily net commodity position consists of inventories related to purchase and sale contracts and exchange-traded contracts. The fair value of our position subject to market risk was approximately \$17.5 million for grain and other cattle feed based on market prices at December 31, 2018. Our market risk at that date, based on the estimated net income effect resulting from a hypothetical 10% change in price, was approximately \$1.3 million.

Item 8. Financial Statements and Supplementary Data.

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

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

None.

Item 9A. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

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

Under the supervision of and participation of our chief executive officer and chief financial officer, management carried out an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2018, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act and concluded that our disclosure controls and procedures were effective.

Management's Annual Report on Internal Control over Financial Reporting

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

Under the supervision and participation of our chief executive officer and chief financial officer, management assessed the design and operating effectiveness of our internal control over financial reporting as of December 31, 2018, based on the Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. We completed the acquisition of two cattle feeding operations in Sublette, Kansas and Tulia, Texas on August 1, 2018. Our management excluded from its assessment of the effectiveness of the company's internal control over financial reporting as of December 31, 2018, the acquired businesses' internal control over financial reporting associated with the acquired assets which represent approximately 5% of the company's consolidated total assets and approximately 3% of the company's consolidated total revenues as of and for the year ended December 31, 2018. Based on this assessment, management concluded that our internal control over financial reporting was effective as of December 31, 2018.

Changes in Internal Control over Financial Reporting

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

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Report of Independent Registered Public Accounting Firm

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

Opinion on Internal Control Over Financial Reporting

We have audited Green Plains Inc. and subsidiaries' (the Company) internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2018 and 2017, and the related consolidated statements of income, comprehensive income, stockholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2018, and related notes (collectively, the consolidated financial statements), and our report dated February 20, 2019 expressed an unqualified opinion on those consolidated financial statements.

The Company completed the acquisition of two cattle feeding operations in Sublette, Kansas and Tulia, Texas on August 1, 2018 (the acquired businesses), and management excluded from its assessment of the effectiveness of the Company's internal control over financial reporting as of December 31, 2018, the acquired businesses' internal control over financial reporting associated with approximately 5% of the Company's consolidated total assets and approximately 3% of the Company's consolidated total revenues as of and for the year ended December 31, 2018. Our audit of internal control over financial reporting of the Company also excluded an evaluation of the internal control over financial reporting of the acquired businesses.

Basis for Opinion

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

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

audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

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

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

/s/ KPMG LLP

Omaha, Nebraska
February 20, 2019

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Item 9B. Other Information.

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

Information in our Proxy Statement for the 2019 Annual Meeting of Stockholders (“Proxy Statement”) under “Corporate Governance,” “Proposal 1 – Election of Directors,” “Our Management,” and “Section 16(a) Beneficial Ownership Reporting Compliance” is incorporated by reference.

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

Item 11. Executive Compensation.

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

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

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

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

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

Item 14. Principal Accounting Fees and Services.

Information in the Proxy Statement under “Independent Public Accountants” is incorporated by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

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

	Page
<u>Report of Independent Registered Public Accounting Firm</u>	F-1
<u>Consolidated Balance Sheets as of December 31, 2018 and 2017</u>	F-2
<u>Consolidated Statements of Income for the years-ended December 31, 2018, 2017 and 2016</u>	F-3
<u>Consolidated Statements of Comprehensive Income for the years-ended December 31, 2018, 2017 and 2016</u>	F-4
<u>Consolidated Statements of Stockholders' Equity for the years-ended December 31, 2018, 2017 and 2016</u>	F-5
<u>Consolidated Statements of Cash Flows for the years-ended December 31, 2018, 2017 and 2016</u>	F-6
<u>Notes to Consolidated Financial Statements</u>	F-8

(2) Financial Statement Schedules. All schedules have been omitted because they are not applicable or the required information is included in the consolidated financial statements or notes thereto.

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

Exhibit Index

Exhibit Description of Exhibit

No.	Description of Exhibit
2.1(a)	<u>Asset Purchase Agreement by and among Ethanol Holding Company, LLC, Green Plains Renewable Energy, Inc., Green Plains Wood River LLC and Green Plains Fairmont LLC dated November 1, 2013 (incorporated herein by reference to Exhibit 2.1 of the company's Current Report on Form 8-K filed November 25, 2013)</u>
2.1(b)	

- Amendment to Asset Purchase Agreement by and among Ethanol Holding Company, LLC, Green Plains Renewable Energy, Inc., Green Plains Wood River LLC and Green Plains Fairmont LLC dated November 22, 2013 (incorporated herein by reference to Exhibit 2.2 of the company's Current Report on Form 8-K filed November 25, 2013)
- 2.2 Membership Interest Purchase Agreement between Murphy Oil USA, Inc. and Green Plains Inc. dated October 28, 2015 (certain exhibits and disclosure schedules to this agreement have been omitted; Green Plains will furnish such exhibits and disclosure schedules to the SEC upon request) (incorporated herein by reference to Exhibit 2.1 to the company's Current Report on Form 8-K dated November 12, 2015)
- 2.3(a) Asset Purchase Agreement, dated June 12, 2016, by and among Green Plains Inc. and Abengoa Bioenergy of Illinois, LLC and Abengoa Bioenergy of Indiana, LLC (incorporated herein by reference to Exhibit 2.1 to the company's Current Report on Form 8-K dated June 13, 2016)
- 2.3(b) Amended and Restated Asset Purchase Agreement, dated August 25, 2016, by and among Green Plains Inc. and Abengoa Bioenergy Company, LLC (incorporated herein by reference to Exhibit 2.1 to the company's Current Report on Form 8-K dated September 1, 2016)
- 2.4(a) Asset Purchase Agreement, dated September 23, 2016, by and among Green Plains Inc., Green Plains Madison LLC, Green Plains Mount Vernon LLC, Green Plains York LLC, Green Plains Holdings LLC, Green Plains Partners LP, Green Plains Operating Company LLC, Green Plains Ethanol Storage LLC and Green Plains Logistics LLC (incorporated herein by reference to Exhibit 2.1 to the company's Current Report on Form 8-K dated September 26, 2016)
- 2.4(b) Amended and Restated Asset Purchase Agreement, dated August 25, 2016, by and among Green Plains Inc., Abengoa BioEnergy of Illinois, LLC and Abengoa BioEnergy of Indiana, LLC (incorporated herein by reference to Exhibit 2.2 to the company's Current Report on Form 8-K dated September 26, 2016)
- 2.5 Stock Purchase Agreement, dated as of October 3, 2016, by and among Green Plains Inc., Green Plains II LLC, SCI Ingredients Holdings, Inc., Stone Canyon Industries LLC and other selling shareholders (incorporated herein by reference to Exhibit 2.1 to the company's Current Report on Form 8-K dated October 3, 2016)

- 2.6(a) Membership Interest Purchase Agreement, dated as of February 16, 2018, by and between AMID Merger LP and DKG Energy Terminals LLC (incorporated herein by reference to Exhibit 2.1(a) of the company's Current Report on Form 8-K filed on February 20, 2018)
- 2.6(b) Guaranty Agreement (Buyer), dated as of February 16, 2018, by and between Delek Logistics Partners, LP and Green Plains Partners LP (incorporated herein by reference to Exhibit 2.1(b) of the company's Current Report on Form 8-K filed on February 20, 2018)
- 2.6(c) Guaranty Agreement (Seller), dated as of February 16, 2018, by and between American Midstream Partners, LP and DKG Energy Terminals LLC (incorporated herein by reference to Exhibit 2.1(c) of the company's Current Report on Form 8-K filed on February 20, 2018)
- 2.6(d) Limited Liability Agreement of DKG Energy Terminals LLC (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K filed on February 20, 2018)
- 2.7 Asset Purchase Agreement, dated as of July 27, 2018, by and among Green Plains Cattle Company LLC, and Bartlett Cattle Company, L.P. (incorporated herein by reference to Exhibit 2.1 of the company's Current Report on Form 8-K filed on August 1, 2018)
- 2.8(a) Asset Purchase Agreement among Green Plains Bluffton LLC, Green Plains Holdings II LLC, Green Plains Inc. and Valero Renewable Fuels Company, LLC, dated October 8, 2018. (incorporated by reference to Exhibit 2.1 of our Current Report on Form 8-K filed on October 10, 2018). (The schedules to the Asset Purchase Agreement have been omitted. The company will furnish such schedules to the SEC upon request.)
- 2.8(b) Asset Purchase Agreement among Green Plains Partners LP, Green Plains Holdings LLC, Green Plains Operating Company LLC, Green Plains Ethanol Storage LLC, Green Plains Logistics LLC, Green Plains Inc., Green Plains Trade Group LLC, Green Plains Bluffton LLC and Green Plains Holdings II LLC (incorporated by reference to Exhibit 2.2 of our Current Report on Form 8-K filed on October 10, 2018). (The schedules to the Asset Purchase Agreement have been omitted. The Partnership will furnish such schedules to the SEC upon request).
- 2.9 Asset Purchase Agreement, dated as of April 25, 2017, by and among Green Plains Cattle Company LLC, and Cargill Cattle Feeders, LLC. (incorporated herein by reference to Exhibit 2.1 to the company's Current Report on Form 8-K dated April 26, 2017)
- 3.1(a) Second Amended and Restated Articles of Incorporation of the company (incorporated herein by reference to Exhibit 3.1 of the company's Current Report on Form 8-K filed October 15, 2008)
- 3.1(b) Articles of Amendment to Second Amended and Restated Articles of Incorporation of Green Plains Renewable Energy, Inc. (incorporated herein by reference to Exhibit 3.1 of the company's Current Report on Form 8-K filed May 9, 2011)
- 3.1(c) Second Articles of Amendment to Second Amended and Restated Articles of Incorporation of Green Plains Renewable Energy, Inc. (incorporated herein by reference to Exhibit 3.1 of the company's Current Report on Form 8-K filed May 16, 2014)
- 3.2 Second Amended and Restated Bylaws of Green Plains Renewable Energy, Inc., dated August 14, 2012 (incorporated herein by reference to Exhibit 3.1 of the company's Current Report on Form 8-K filed August 15, 2012)
- 4.1 Shareholders' Agreement by and among Green Plains Renewable Energy, Inc., each of the investors listed on Schedule A, and each of the existing shareholders and affiliates identified on Schedule B, dated May 7, 2008 (incorporated herein by reference to Appendix F of the company's Registration Statement on Form S-4/A filed September 4, 2008)
- 4.2 Form of Senior Indenture (incorporated herein by reference to Exhibit 4.5 of the company's Registration Statement on Form S-3/A filed December 30, 2009)
- 4.3

Form of Subordinated Indenture (incorporated herein by reference to Exhibit 4.6 of the company's Registration Statement on Form S-3/A filed December 30, 2009)

- 4.4 Indenture relating to the 3.25% Convertible Senior Notes due 2018, dated as of September 20, 2013, between Green Plains Renewable Energy, Inc. and Willington Trust, National Association, including the form of Global Note attached as Exhibit A thereto (incorporated herein by reference to Exhibit 4.1 to the company's Current Report on Form 8-K filed September 20, 2013)

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- 4.5 Indenture relating to the 4.125% Convertible Senior Notes due 2022, dated as of August 15, 2016, between Green Plains Inc. and Wilmington Trust, National Association, including the form of Global Note attached as Exhibit A thereto (incorporated herein by reference to Exhibit 4.1 to the company's Current Report on Form 8-K filed August 15, 2016)
- 4.6 Indenture relating to the 3.25% Convertible Senior Notes due 2019, dated as of August 14, 2018, between Green Plains Inc. and Wilmington Trust, National Association, as trustee (including therein Form of 3.25% Convertible Senior Notes Due 2019) (incorporated herein by reference to Exhibit 4.1 to the company's Current Report on Form 8-K filed August 14, 2018)
- *10.1 2007 Equity Incentive Plan (incorporated herein by reference to Appendix A of the company's Definitive Proxy Statement filed March 27, 2007)
- 10.2 Form of Indemnification Agreement (incorporated herein by reference to Exhibit 10.53 of the company's Registration Statement on Form S-4/A filed August 1, 2008)
- *10.3(a) Employment Agreement with Todd Becker (incorporated herein by reference to Exhibit 10.54 of the company's Registration Statement on Form S-4/A filed August 1, 2008)
- *10.3(b) Amendment No. 1 to Employment Agreement with Todd Becker, dated December 18, 2009. (incorporated herein by reference to Exhibit 10.7(b) of the company's Annual Report on Form 10-K filed February 24, 2010)
- *10.3(c) Amendment No. 2 to Employment Agreement with Todd Becker, dated 27, 2018 (incorporated herein by reference to Exhibit 10.52 of the company's Quarterly Report on Form 10-Q filed on May 7, 2018)
- *10.4 Employment Agreement dated September 27, 2016 by and between the company and Kenneth M. Simril (incorporated herein by reference to Exhibit 10.51 of the company's Quarterly Report on Form 10-Q filed on May 7, 2018)
- *10.5(a) 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K dated May 11, 2009)
- *10.5(b) Amendment No. 1 to the 2009 Equity Incentive Plan (incorporated herein by reference to Appendix A of the company's Definitive Proxy Statement filed March 25, 2011)
- *10.5(c) Amendment No. 2 to the 2009 Equity Incentive Plan (incorporated herein by reference to Appendix A of the company's Definitive Proxy Statement filed March 29, 2013)
- *10.5(d) Amended and Restated 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 99.1 of the company's Registration Statement on Form S-8 filed June 23, 2017)
- *10.5(e) Form of Stock Option Award Agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.19(b) of the company's Annual Report on Form 10-K filed February 24, 2010)
- *10.5(f) Form of Restricted Stock Award Agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.19(c) of the company's Annual Report on Form 10-K/A (Amendment No. 1) filed February 25, 2010)
- *10.5(g) Amended Form of Restricted Stock Award agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.53 of the company's Quarterly Report on Form 10-Q filed on May 7, 2018)
- *10.5(h) Form of Deferred Stock Unit Award Agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.19(d) of the company's Annual Report on Form 10-K filed February 24, 2010)
- *10.5(i) Form of Performance Share Unit Award agreement for 2009 Equity Incentive Plan (incorporated herein by reference to Exhibit 10.54 of the company's Quarterly Report on Form 10-Q filed on May 7, 2018)
- 10.6(a) Second Amended and Restated Revolving Credit and Security Agreement dated April 26, 2013 by and among Green Plains Trade Group LLC and PNC Bank, National Association (as Lender and Agent) (incorporated herein by reference to Exhibit 10.2 of the company's Quarterly Report on Form 10-Q filed May 2, 2013)

10.6(b) Third Amended and Restated Revolving Credit and Security Agreement dated November 26, 2014 by and among Green Plains Trade Group LLC, the Lenders and PNC Bank, National Association (as Lender and Agent) (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K filed December 2, 2014)

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- 10.6(c) Fourth Amended and Restated Revolving Credit and Security Agreement dated July 28, 2017, among Green Plains Trade Group LLC, the Lenders and PNC Bank, National Association as Lender and Agent (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated July 31, 2017)
- 10.6(d) First Amendment to Fourth Amended and Restated Revolving Credit and Security Agreement, dated as of August 29, 2017, among Green Plains Trade Group LLC and PNC Bank, National Association, as agent, and the lenders party to the Credit and Security Agreement (incorporated herein by reference to Exhibit 10.4(a) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.6(e) Second Amendment to Fourth Amended and Restated Revolving Credit and Security Agreement, dated as of March 15, 2018, by and among Green Plains Trade Group LLC and PNC Bank, National Association (incorporated herein by reference to Exhibit 10.1 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.6(f) Revolving Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and Citibank, N.A. (incorporated herein by reference to Exhibit 10.2(b) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
- 10.6(g) Revolving Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and BMO Harris Bank N.A. (incorporated herein by reference to Exhibit 10.2(c) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
- 10.6(h) Revolving Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and Alostara Bank of Commerce (incorporated herein by reference to Exhibit 10.2(d) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
- 10.6(i) Second Amended and Restated Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and PNC Bank, National Association (Incorporated by reference to Exhibit 10.2(a) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
- 10.6(j) Revolving Credit Note dated April 26, 2013 by and among Green Plains Trade Group LLC and Bank of America (incorporated here by reference to Exhibit 10.2(e) of the company's Quarterly Report on Form 10-Q filed May 2, 2013)
- 10.6(k) ABL Intercreditor Agreement, dated as of August 29, 2017, among PNC Bank, National Association, as ABL Collateral Agent, and BNP Paribas, as Term Loan Collateral Agent, and acknowledged by Green Plains Trade Group LLC and the other ABL Grantors (incorporated herein by reference to Exhibit 10.4(b) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.6(l) Guaranty, dated as of August 29, 2017, in favor of PNC Bank, National Association, as agent (incorporated herein by reference to Exhibit 10.4(c) to the company's Current Report on Form 8-K dated August 29, 2017)
- *10.7 Umbrella Short-Term Incentive Plan (incorporated herein by reference to Appendix A of the company's Proxy Statement filed April 3, 2014)
- *10.8 Director Compensation effective May 11, 2016 (incorporated herein by reference to Exhibit 10.4 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- *10.9 Director Compensation effective November 14, 2017 (incorporated herein by reference to Exhibit 10.9 of the company's Annual Report on Form 10-K filed February 15, 2018)
- *10.10 Employment Agreement dated March 4, 2011 by and between the company and Jeffrey S. Briggs (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K filed March 8, 2011)
- *10.11 Employment Agreement dated March 4, 2011 by and between the company and Carl S. (Steve) Bleyl (incorporated herein by reference to Exhibit 10.2 of the company's Current Report on Form 8-K filed March 8, 2011)

10.12(a) Credit Agreement dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc., BNP Paribas Securities Corp. as Lead Arranger, Rabo Agrifinance, Inc. as Syndication Agent, ABN AMRO Capital USA LLC as Documentation Agent and BNP Paribas as Administrative Agent (incorporated herein by reference to Exhibit 10.1 of the company's Current Report on Form 8-K filed November 3, 2011)

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- 10.12(b) Security Agreement dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc. and BNP Paribas (incorporated herein by reference to Exhibit 10.2 of the company's Current Report on Form 8-K filed November 3, 2011)
- 10.12(c) Promissory Note dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc. and Bank of Oklahoma (incorporated herein by reference to Exhibit 10.3 of the company's Current Report on Form 8-K filed November 3, 2011)
- 10.12(d) Promissory Note dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc. and U.S. Bank National Association (incorporated herein by reference to Exhibit 10.4 of the company's Current Report on Form 8-K filed November 3, 2011)
- 10.12(e) Promissory Note dated October 28, 2011 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc. and Farm Credit Bank of Texas (incorporated herein by reference to Exhibit 10.5 of the company's Current Report on Form 8-K filed November 3, 2011)
- 10.12(f) First Amendment to Credit Agreement dated January 6, 2012 by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex Inc., BNP Paribas and the Required Lenders (incorporated herein by reference to Exhibit 10.26(k) of the company's Annual Report on Form 10-K filed February 17, 2012)
- 10.12(g) Second Amendment to Credit Agreement, dated October 26, 2012, by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex, Inc., BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.5 of the company's Quarterly Report on Form 10-Q filed November 1, 2012)
- 10.12(h) Third Amendment to Credit Agreement, dated August 27, 2013, by and among Green Plains Grain Company LLC, Green Plains Grain Company TN LLC, Green Plains Essex, Inc., BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.3 of the company's Quarterly Report on Form 10-Q filed October 31, 2013)
- 10.12(i) Fourth Amendment to Credit Agreement, dated August 8, 2014, by and among Green Plains Grain Company LLC (including in its capacity as successor by merger to Green Plains Essex Inc.), Green Plains Grain Company TN LLC, BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.3 of the company's Quarterly Report on Form 10-Q filed October 30, 2014)
- 10.12(j) Fifth Amendment to Credit Agreement, dated June 1, 2015, by and among Green Plains Grain Company LLC (including in its capacity as successor by merger to Green Plains Essex Inc.), Green Plains Grain Company TN LLC, BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.5 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.12(k) Sixth Amendment to Credit Agreement, dated January 5, 2016, by and among Green Plains Grain Company LLC (including in its capacity as successor by merger to Green Plains Essex Inc.), Green Plains Grain Company TN LLC, BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.6 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.12(l) Seventh Amendment to Credit Agreement, dated July 27, 2016, by and among Green Plains Grain Company LLC (including in its capacity as successor by merger to Green Plains Essex Inc.), Green Plains Grain Company TN LLC, BNP Paribas, as the administrative agent under the Credit Agreement, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.7 of the company's

Quarterly Report on Form 10-Q filed August 3, 2016)

- 10.12(m) Eighth Amendment to Credit Agreement, dated as of August 29, 2017, among Green Plains Grain Company and BNP Paribas, as Administrative Agent, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.3(a) to the company's Current Report on Form 8-K dated August 29, 2017)

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- 10.12(n) ABL Intercreditor Agreement, dated as of August 29, 2017, among BNP Paribas, as ABL Collateral Agent, and BNP Paribas, as Term Loan Collateral Agent, and acknowledged by Green Plains Grain Company LLC and the other ABL Grantors (incorporated herein by reference to Exhibit 10.3(b) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.12(o) Guaranty, dated as of August 29, 2017, in favor of BNP Paribas, as administrative agent (incorporated herein by reference to Exhibit 10.3(c) to the company's Current Report on Form 8-K dated August 29, 2017)
- *10.13 Employment Agreement by and between Green Plains Renewable Energy, Inc. and Patrich Simpkins dated April 1, 2012 (incorporated herein by reference to Exhibit 10.2 of the company's Quarterly Report on Form 10-Q filed May 1, 2014)
- *10.14 Employment Agreement with John Nepl (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated September 5, 2017)
- 10.15(a) Term Loan Agreement, dated as of June 10, 2014, among Green Plains Processing, LLC, as Borrower, the Lenders Party Hereto, BNP Paribas, as Administrative Agent and as Collateral Agent, and BMO Capital Markets and BNP Paribas Securities Corp., as Joint Lead Arrangers and Joint Book Runners (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(b) Guaranty - Green Plains Inc. (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(c) Guaranty - Green Plains Processing Subsidiaries (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(d) Pledge Agreement (incorporated herein by reference to Exhibit 10.4 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(e) Security Agreement (incorporated herein by reference to Exhibit 10.5 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(f) Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Atkinson LLC (State of Nebraska) (incorporated herein by reference to Exhibit 10.6 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(g) Amendment to Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Atkinson LLC, as trustor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.12 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(h) First Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Atkinson LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.37 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(i) Second Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Atkinson LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.38 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(k) Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Central City LLC (State of Nebraska) (incorporated herein by reference to Exhibit 10.7 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(l) Amendment to Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Central City LLC, as trustor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.13 to the company's Current Report on Form 8-K dated June 16, 2015)

- 10.15(m) First Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Central City LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.39 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)

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- 10.15(n) Second Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Central City LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.40 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(o) Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Ord LLC (State of Nebraska) (incorporated herein by reference to Exhibit 10.8 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(p) Amendment to Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Ord LLC, as trustor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.14 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(q) First Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Ord LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.21 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(r) Second Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Ord LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.22 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(s) Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Bluffton LLC (State of Indiana) (incorporated herein by reference to Exhibit 10.9 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(t) Amendment to Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Bluffton LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Indiana) (incorporated herein by reference to Exhibit 10.11 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(u) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Bluffton LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Indiana) (incorporated herein by reference to Exhibit 10.27 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(v) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Bluffton LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Indiana) (incorporated herein by reference to Exhibit 10.28 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(w) Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Otter Tail LLC (State of Minnesota) (incorporated herein by reference to Exhibit 10.10 to the company's Current Report on Form 8-K dated June 12, 2014)
- 10.15(x) Amendment to Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Otter Tail LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Minnesota) (incorporated herein by reference to Exhibit 10.10 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(y) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Otter Tail LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Minnesota) (incorporated herein by reference to Exhibit 10.13 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)

- 10.15(z) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Otter Tail LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Minnesota) (incorporated herein by reference to Exhibit 10.14 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(aa) Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Shenandoah LLC (State of Iowa) (incorporated herein by reference to Exhibit 10.11 to the company's Current Report on Form 8-K dated June 12, 2014)

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- 10.15(bb) Amendment to Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Shenandoah LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Iowa) (incorporated herein by reference to Exhibit 10.15 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(cc) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Shenandoah LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Iowa) (incorporated herein by reference to Exhibit 10.11 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(dd) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Shenandoah LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Iowa) (incorporated herein by reference to Exhibit 10.12 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ee) First Amendment to Term Loan Agreement, dated as of June 11, 2015, among Green Plains as Borrower, the Lenders Party Hereto, BNP Paribas, as Administrative Agent and as Collateral Agent, and BMO Capital Markets and BNP Paribas Securities Corp., as Joint Lead Arrangers and Joint Book Runners (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(ff) Second Amendment to Term Loan Agreement, dated as of June 11, 2015, by and between Green Plains Processing, BNP Paribas, as Administrative Agent and Collateral Agent and as a Lender (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(gg) Joinder Agreement (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(hh) Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Fairmont LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Minnesota) (incorporated herein by reference to Exhibit 10.4 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(ii) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Fairmont LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Minnesota) (incorporated herein by reference to Exhibit 10.25 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(jj) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Fairmont LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Minnesota) (incorporated herein by reference to Exhibit 10.26 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(kk) Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Holdings II LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Iowa) (incorporated herein by reference to Exhibit 10.5 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(ll) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Holdings II LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Iowa) (incorporated herein by reference to Exhibit 10.5 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(mm) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Holdings II LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Iowa) (incorporated herein by reference to Exhibit 10.6 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)

- 10.15(n) Mortgage by and from Green Plains Holdings II LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Michigan) (incorporated herein by reference to Exhibit 10.6 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(o) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Holdings II LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Michigan) (incorporated herein by reference to Exhibit 10.43 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)

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- 10.15(pp) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Holdings II LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Michigan) (incorporated herein by reference to Exhibit 10.44 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(qq) Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing by and from Green Plains Obion LLC, as trustor, to the trustee named therein for the benefit of BNP Paribas (State of Tennessee) (incorporated herein by reference to Exhibit 10.7 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(rr) First Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Obion LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Tennessee) (incorporated herein by reference to Exhibit 10.35 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ss) Second Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Obion LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Tennessee) (incorporated herein by reference to Exhibit 10.36 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(tt) Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Superior LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Iowa) (incorporated herein by reference to Exhibit 10.8 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(uu) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Superior LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Iowa) (incorporated herein by reference to Exhibit 10.17 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(vv) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Green Plains Superior LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Iowa) (incorporated herein by reference to Exhibit 10.18 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ww) Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Wood River LLC, as trustor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.9 to the company's Current Report on Form 8-K dated June 16, 2015)
- 10.15(xx) First Lien Fee and Leasehold Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Wood River LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.19 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(yy) Second Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Wood River LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.20 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(zz) Second Amendment to Second Amended and Restated Security Agreement, dated as of April 13, 2018, by and among Green Plains Commodity Management LLC and PNC Bank, National Association (incorporated herein by reference to Exhibit 10.2 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ab) First Lien Deed of Trust Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as grantor, to the trustee names therein for the benefit

- 10.15(ac) of BNP Paribas (Montebello, California) (incorporated herein by reference to Exhibit 10.9 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
Second Lien Deed of Trust Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as grantor, to the trustee names therein for the benefit of BNP Paribas (Montebello California) (incorporated herein by reference to Exhibit 10.10 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)

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- 10.15(ad) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Mount Vernon LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Indiana) (incorporated herein by reference to Exhibit 10.15 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ae) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Mount Vernon LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Indiana) (incorporated herein by reference to Exhibit 10.16 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(af) First Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains York LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.23 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ag) Second Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains York LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Nebraska) (incorporated herein by reference to Exhibit 10.24 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ah) First Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Hopewell LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Virginia) (incorporated herein by reference to Exhibit 10.29 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ai) Second Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Hopewell LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Virginia) (incorporated herein by reference to Exhibit 10.30 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(aj) First Lien Leasehold Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Madison LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Illinois) (incorporated herein by reference to Exhibit 10.31 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ak) Second Lien Leasehold Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Madison LLC, as mortgagor, to and for the benefit of BNP Paribas (State of Illinois) (incorporated herein by reference to Exhibit 10.32 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(al) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of BNP Paribas (State of Illinois) (incorporated herein by reference to Exhibit 10.41 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(am) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of BNP Paribas (State of Illinois) (incorporated herein by reference to Exhibit 10.42 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(an) First Lien Fee and Leasehold Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Hereford LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Texas) (incorporated herein by reference to Exhibit 10.49 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.15(ao)

Second Lien Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by and from Green Plains Hereford LLC, as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Texas) (incorporated herein by reference to Exhibit 10.50 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)

- 10.16(a) Credit Agreement dated December 3, 2014 among Green Plains Cattle Company, LLC, Bank of the West and ING Capital LLC, as Joint Administrative Agents, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated December 5, 2014)

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- 10.16(b) Security and Pledge Agreement dated December 3, 2014 among Green Plains Cattle Company, LLC, and Bank of the West and ING Capital LLC in their capacity as Joint Administrative Agents (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated December 5, 2014)
- 10.16(c) Second Amendment to the Credit Agreement, dated as of April 28, 2017, by and among Green Plains Cattle Company LLC and Bank of the West and ING Capital LLC. (joint administrative agents for lenders). (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated May 1, 2017)
- 10.16(d) Third Amendment to the Credit Agreement, dated June 29, 2017, among Green Plains Cattle Company LLC, Bank of the West and ING Capital LLC, as Joint Administrative Agents, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.2 of the company's Quarterly Report on Form 10-Q filed August 3, 2017)
- 10.16(e) Fourth Amendment to the Credit Agreement, dated as of August 29, 2017, among Green Plains Cattle Company LLC, Bank of the West and ING Capital LLC, as Joint Administrative Agents, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.2(a) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.16(f) Fifth Amendment to the Credit Agreement, dated as of November 16, 2017, among Green Plains Cattle Company LLC, Bank of the West and ING Capital LLC, as Joint Administrative Agents, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated November 17, 2017)
- 10.16(g) Replacement Page for Fifth Amendment to the Credit Agreement, dated as of November 16, 2017, among Green Plains Cattle Company LLC, Bank of the West and ING Capital LLC, as Joint Administrative Agents, and the lenders party to the Credit Agreement, originally filed as Exhibit 10.1 to the company's Current Report on Form 8-K dated November 17, 2017 (incorporated herein by reference to Exhibit 10.1 to the company's Quarterly Report on Form 10-Q dated August 2, 2018)
- 10.16(h) Sixth Amendment to the Credit Agreement, dated as of July 31, 2018, by and among Green Plains Cattle Company LLC and Bank of the West and ING Capital LLC, as Joint Administrative Agents, and the lenders party to the Credit Agreement (incorporated herein by reference to Exhibit 10.4 to the company's Quarterly Report on Form 10-Q dated August 2, 2018)
- 10.16(i) ABL Intercreditor Agreement, dated as of August 29, 2017, among Bank of the West and ING Capital LLC, as Joint ABL Collateral Agent, and BNP Paribas, as Term Loan Collateral Agent, and acknowledged by Green Plains Cattle Company LLC and the other ABL Grantors (incorporated herein by reference to Exhibit 10.2(b) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.16(j) Guaranty, dated as of August 29, 2017, in favor of Bank of the West and ING Capital LLC, as joint administrative agents (incorporated herein by reference to Exhibit 10.2(c) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.17 Contribution, Conveyance and Assumption Agreement, dated July 1, 2015, by and among Green Plains Inc., Green Plains Obion LLC, Green Plains Trucking LLC, Green Plains Holdings LLC, Green Plains Partners LP and Green Plains Operating Company LLC (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.18(a) Omnibus Agreement, dated July 1, 2015, by and among Green Plains Inc., Green Plains Holdings LLC, Green Plains Partners LP and Green Plains Operating Company LLC (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.18(b) First Amendment to the Omnibus Agreement, dated January 1, 2016, by and among Green Plains Inc., Green Plains Holdings LLC, Green Plains Partners LP and Green Plains Operating Company LLC (incorporated herein by reference to Exhibit 10.22(b) to the company's Annual Report on Form 10-K for the

year ended December 31, 2015)

10.18(c) Second Amendment to the Omnibus Agreement, dated September 23, 2016, by and among Green Plains Inc., Green Plains Partners LP, Green Plains Holdings LLC and Green Plains Operating Company LLC (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated September 26, 2016)

10.18(d) Third Amendment to the Omnibus Agreement, dated November 15, 2018, by and among Green Plains Inc., Green Plains Partners LP, Green Plains Holdings LLC and Green Plains Operating Company LLC

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- 10.19(a) Operational Services and Secondment Agreement, dated July 1, 2015, by and between Green Plains Inc. and Green Plains Holdings LLC (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.19(b) Amendment No. 1 to the Operational Services and Secondment Agreement, dated January 1, 2016, by and between Green Plains Inc. and Green Plains Holdings LLC (incorporated herein by reference to Exhibit 10.23(b) to the company's Annual Report on Form 10-K for the year ended December 31, 2015)
- 10.19(c) Amendment No. 2 to Operational Services and Secondment Agreement, dated September 23, 2016, between Green Plains Inc. and Green Plains Holdings LLC (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated September 26, 2016)
- 10.19(d) Amendment No. 3 to Operational Services and Secondment Agreement, dated November 15, 2018, between Green Plains Inc. and Green Plains Holdings LLC
- 10.20(a) Rail Transportation Services Agreement, dated July 1, 2015, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.4 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.20(b) Amendment No. 1 to Rail Transportation Services Agreement, dated September 1, 2015, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.1 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.20(c) Correction to Rail Transportation Services Agreement, dated May 12, 2016, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.3 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.20(d) Amendment No. 2 to Rail Transportation Services Agreement, dated November 30, 2016 (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated December 1, 2016)
- 10.20(e) Amendment No. 2 to Rail Transportation Services Agreement, dated November 15, 2018 (incorporated herein by reference to Exhibit 10.1 to the company's Current Report on Form 8-K dated November 15, 2018)
- 10.20(f) Corrective Amendment to Rail Transportation Services Agreement, dated November 15, 2018, by and between Green Plains Logistics LLC and Green Plains Trade Group LLC
- 10.21(a) Ethanol Storage and Throughput Agreement, dated July 1, 2015, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.5 to the company's Current Report on Form 8-K dated July 6, 2015)
- 10.21(b) Amendment No. 1 to the Ethanol Storage and Throughput Agreement, dated January 1, 2016, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.25(b) to the company's Annual Report on Form 10-K for the year ended December 31, 2015)
- 10.21(c) Clarifying Amendment to Ethanol Storage and Throughput Agreement, dated January 4, 2016, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.2 of the company's Quarterly Report on Form 10-Q filed August 3, 2016)
- 10.21(d) Amendment No. 2 to Ethanol Storage and Throughput Agreement, dated September 23, 2016, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.3 to the company's Current Report on Form 8-K dated September 26, 2016)
- 10.21(e) Amendment No. 3 to Ethanol Storage and Throughput Agreement, dated November 15, 2018, by and between Green Plains Ethanol Storage LLC and Green Plains Trade Group LLC (incorporated herein by reference to Exhibit 10.2 to the company's Current Report on Form 8-K dated November 15, 2018) (The exhibits to Amendment No. 3 have been omitted. The company will furnish such schedules to the SEC upon request).
- 10.22(a)

Credit Agreement, dated July 1, 2015, by and among Green Plains Operating Company LLC, as the Borrower, the subsidiaries of the Borrower identified therein, Bank of America, N.A., and the other lenders party thereto (incorporated herein by reference to Exhibit 10.6 to the company's Current Report on Form 8-K dated July 6, 2015)

10.22(b) First Amendment to Credit Agreement, dated September 16, 2016 by and among Green Plains Operating Company LLC, as the Borrower, the subsidiaries of the Borrower identified therein, Bank of America, N.A., and the other lenders party thereto

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- 10.22(c) Incremental Joinder Agreement, dated October 27, 2017, among Green Plains Operating Company LLC and Bank of America, as Administrative (incorporated herein by reference to Exhibit 10.8 to the company's Quarterly Report on Form 10-Q dated November 2, 2017)
- 10.22(d) Second Amendment to Credit Agreement, dated February 16, 2018 by and among Green Plains Operating Company LLC, as the Borrower, the subsidiaries of the Borrower identified therein, Bank of America, N.A., and the other lenders party thereto
- 10.22(e) Incremental Joinder Agreement, dated February 20, 2018, among Green Plains Operating Company LLC and Bank of America, as Administrative
- 10.22(f) Third Amendment to Credit Agreement, dated October 12, 2018 by and among Green Plains Operating Company LLC, as the Borrower, the subsidiaries of the Borrower identified therein, Bank of America, N.A., and the other lenders party thereto
- 10.23 Asset Purchase Agreement, dated January 1, 2016, by and among Green Plains Inc., Green Plains Hereford LLC, Green Plains Hopewell LLC, Green Plains Holdings LLC, Green Plains Partners LP, Green Plains Operating Company LLC, Green Plains Ethanol Storage LLC and Green Plains Logistics LLC (incorporated herein by reference to Exhibit 10.27 to the company's Annual Report on Form 10-K for the year ended December 31, 2015)
- 10.24(a) Credit Agreement, dated as of October 3, 2016, by and among Green Plains II LLC, Green Plains I LLC (as borrower and guarantor) and Maranon Capital, L.P. (as agent for lenders), (incorporated herein by reference to Exhibit 10.1(a) to the company's Current Report on Form 8-K dated October 3, 2016)
- 10.24(b) Term Notes, dated as of October 3, 2016, by and among Green Plains II LLC (as borrower), Northwestern Mutual Life Insurance Company, Axa Equitable Life Insurance Company, Metropolitan Life Insurance Company and MetLife Insurance Company USA (as lenders) and Maranon Capital, L.P. (as agent for lenders), (incorporated herein by reference to Exhibit 10.1(b) to the company's Current Report on Form 8-K dated October 3, 2016)
- 10.24(c) Revolving Notes, dated as of October 3, 2016, by and among Green Plains II LLC (as borrower), Northwestern Mutual Life Insurance Company, Metropolitan Life Insurance Company (as lenders) and Maranon Capital, L.P. (as agent for lenders), (incorporated herein by reference to Exhibit 10.1(c) to the company's Current Report on Form 8-K dated October 3, 2016)
- 10.24(d) Borrower Joinder to Credit Agreement and Notes, dated as of October 3, 2016, by and among SCI Ingredients Holdings, Inc., FVC Intermediate Holdings, Inc., Fleischmann's Vinegar Company, Inc., FVC Houston, Inc. (as new borrowers) and Maranon Capital, L.P. (as agent for lenders), (incorporated herein by reference to Exhibit 10.1(d) to the company's Current Report on Form 8-K dated October 3, 2016)
- 10.24(e) Security Agreement, dated as of October 3, 2016, by and among Green Plains II LLC, Green Plains I LLC (as borrowers and guarantor) and Maranon Capital, L.P. (as agent for lenders), (incorporated herein by reference to Exhibit 10.1(e) to the company's Current Report on Form 8-K dated October 3, 2016)
- 10.24(f) Joinder Agreement to Security Agreement, dated as of October 3, 2016, by and among SCI Ingredients Holdings, Inc., FVC Intermediate Holdings, Inc., Fleischmann's Vinegar Company, Inc., FVC Houston, Inc. and Maranon Capital, L.P. (as agent for lenders), (incorporated herein by reference to Exhibit 10.1(f) to the company's Current Report on Form 8-K dated October 3, 2016)
- 10.24(g) Pledge Agreement, dated as of October 3, 2016, by and among Green Plains II LLC, Green Plains I LLC (as pledgors) and Maranon Capital, L.P. (as agent for lenders), (incorporated herein by reference to Exhibit 10.1(g) to the company's Current Report on Form 8-K dated October 3, 2016)
- 10.24(h) Pledge Supplement, dated as of October 3, 2016, by and among Green Plains II LLC and each Pledgor and Maranon Capital, L.P. (as agent for lenders), (incorporated herein by reference to Exhibit 10.1(h) to the company's Current Report on Form 8-K dated October 3, 2016)

10.24(i) Joinder to Pledge Agreement, dated as of October 3, 2016, by and among SCI Ingredients Holdings, Inc., FVC Intermediate Holdings, Inc., Fleischmann's Vinegar Company, Inc., FVC Houston, Inc. (as new pledgers) and Maranon Capital, L.P. (as agent for lenders). (incorporated herein by reference to Exhibit 10.1(i) to the company's Current Report on Form 8-K dated October 3, 2016)

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- 10.24(j) Mortgage, Security Agreement, Assignment of Leases and Rents and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of Maranon Capital, L.P. (State of Alabama) (incorporated herein by reference to Exhibit 10.22(j) to the company's Annual Report on Form 10-K for the year ended December 31, 2016)
- 10.24(k) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of BNP Paribas (State of Alabama) (incorporated herein by reference to Exhibit 10.7 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.24(l) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of BNP Paribas (State of Alabama) (incorporated herein by reference to Exhibit 10.8 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.24(m) Deed of Trust, Security Agreement, Assignment of Leases and Rents and Fixture Filing by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of Maranon Capital, L.P. (State of California) (incorporated herein by reference to Exhibit 10.22(k) to the company's Annual Report on Form 10-K for the year ended December 31, 2016)
- 10.24(n) First Lien Deed of Trust Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as grantor, to the trustee names therein for the benefit of BNP Paribas (Cerritos, California) (incorporated herein by reference to Exhibit 10.45 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.24(o) Second Lien Deed of Trust Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as grantor, to the trustee names therein for the benefit of BNP Paribas (Cerritos, California) (incorporated herein by reference to Exhibit 10.46 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.24(p) Mortgage, Security Agreement, Assignment of Leases and Rents and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of Maranon Capital, L.P. (State of Illinois) (incorporated herein by reference to Exhibit 10.22(l) to the company's Annual Report on Form 10-K for the year ended December 31, 2016)
- 10.24(q) Deed of Trust, Security Agreement, Assignment of Leases and Rents and Fixture Filing by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of Maranon Capital, L.P. (State of Maryland) (incorporated herein by reference to Exhibit 10.22(m) to the company's Annual Report on Form 10-K for the year ended December 31, 2016)
- 10.24(r) First Lien Indemnity Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Maryland) (incorporated herein by reference to Exhibit 10.33 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.24(s) Second Lien Indemnity Deed of Trust, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as grantor, to the trustee named therein for the benefit of BNP Paribas (State of Maryland) (incorporated herein by reference to Exhibit 10.34 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.24(t) Deed of Trust, Security Agreement, Assignment of Leases and Rents and Fixture Filing by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of Maranon Capital, L.P. (State of Missouri) (incorporated herein by reference to Exhibit 10.22(n) to the company's Annual Report on Form 10-K for the year ended December 31, 2016)
- 10.24(u)

Mortgage, Security Agreement, Assignment of Leases and Rents and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of Maranon Capital, L.P. (State of New York) (incorporated herein by reference to Exhibit 10.22(o) to the company's Annual Report on Form 10-K for the year ended December 31, 2016)

- 10.24(v) First Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of BNP Paribas (State of New York) (incorporated herein by reference to Exhibit 10.47 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)

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- 10.24(w) Second Lien Mortgage, Assignment of Leases and Rents, Security Agreement and Fixture Filing Statement by Fleischmann's Vinegar Company, Inc., as mortgagor, to and for the benefit of BNP Paribas (State of New York) (incorporated herein by reference to Exhibit 10.48 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.25(a) Term Loan Agreement, dated as of August 29, 2017, among Green Plains Inc., BNP Paribas, as administrative agent and collateral agent and BNP Paribas Securities Corp., BMO Capital Markets Corp. and Merrill Lynch, Pierce, Fenner & Smith Incorporated, as joint lead arrangers and joint book runners (incorporated herein by reference to Exhibit 10.1(a) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.25(b) First Amendment to Term Loan Agreement, dated October 16, 2017, among Green Plains, Inc. and BNP Paribas, as administrative agent and collateral agent (incorporated herein by reference to Exhibit 10.7 to the company's Quarterly Report on Form 10-Q dated November 2, 2017)
- 10.25(c) Second Amendment to Term Loan Agreement, dated July 13, 2018, among Green Plains Inc. and BNP Paribas, as administrative agent and collateral agent (incorporated herein by reference to Exhibit 10.3 to the company's Quarterly Report on Form 10-Q dated August 2, 2018)
- 10.25(d) Guaranty, dated as of August 29, 2017, in favor of BNP Paribas, as collateral agent and administrative agent, and the other lenders party to the Term Loan Agreement (incorporated herein by reference to Exhibit 10.1(b) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.25(e) Pledge Agreement, dated as of August 29, 2017, among Green Plains Inc., its subsidiaries and BNP Paribas, as collateral agent (incorporated herein by reference to Exhibit 10.1(c) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.25(f) Security Agreement, dated as of August 29, 2017, among Green Plains Inc., its subsidiaries and BNP Paribas, as collateral agent (incorporated herein by reference to Exhibit 10.1(d) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.25(g) Term Loan Intercreditor and Collateral Agency Agreement, dated as of August 29, 2017, among BNP Paribas, as Term Loan Collateral Agent, BNP Paribas, as Pari Passu Collateral Agent, Bank of the West and ING Capital LLC, as ABL-Cattle Agent, BNP Paribas, as ABL-Grain Agent, PNC Bank, National Association, as ABL-Trade Agent, and acknowledged by Green Plains Inc. and new grantors (incorporated herein by reference to Exhibit 10.1(e) to the company's Current Report on Form 8-K dated August 29, 2017)
- 10.26 Partial Release of Security Interest, dated as of April 30, 2018, by and among Green Plains Inc., its subsidiaries and BNP Paribas, as collateral agent (incorporated herein by reference to Exhibit 10.3 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 10.27 Revolving Credit Facility, dated as of April 30, 2018, by and among Green Plains Commodity Management LLC and Macquarie Bank Limited (incorporated herein by reference to Exhibit 10.4 to the company's Quarterly Report on Form 10-Q dated May 7, 2018)
- 21.1 Schedule of Subsidiaries
- 23.1 Consent of KPMG LLP
- 31.1 Certification of Chief Executive Officer pursuant to Rule 13a-14(a) and Section 302 of the Sarbanes-Oxley Act of 2002
- 31.2 Certification of Chief Financial Officer pursuant to Rule 13a-14(a) and Section 302 of the Sarbanes-Oxley Act of 2002
- 32.1 Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
- 32.2 Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002

101 The following information from Green Plains Inc.'s Annual Report on Form 10-K for the annual period ended December 31, 2018, formatted in Extensible Business Reporting Language (XBRL): (i) the Consolidated Balance Sheets, (ii) the Consolidated Statements of Income, (iii) the Consolidated Statements of Comprehensive Income (iv) the Consolidated Statements of Stockholders' Equity (v) the Consolidated Statements of Cash Flows and (vi) the Notes to Consolidated Financial Statements and Financial Statement Schedule.

* Represents management compensatory contracts

Item 16. Form 10-K Summary.

None.

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SIGNATURES

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

GREEN PLAINS INC.

(Registrant)

Date: February 20, 2019

By: /s/ Todd A. Becker

Todd A. Becker

President and Chief Executive Officer

(Principal Executive Officer)

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

Signature	Title	Date
/s/ Todd A. Becker Todd A. Becker	President and Chief Executive Officer (Principal Executive Officer) and Director	February 20, 2019
/s/ John W. Neppl John W. Neppl	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	February 20, 2019

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/s/ Wayne B. Hoovestol Wayne B. Hoovestol	Chairman of the Board	February 20, 2019
/s/ Jim Anderson Jim Anderson	Director	February 20, 2019
/s/ James F. Crowley James F. Crowley	Director	February 20, 2019
/s/ S. Eugene Edwards S. Eugene Edwards	Director	February 20, 2019
/s/ Gordon F. Glade Gordon F. Glade	Director	February 20, 2019
/s/ Ejnar A. Knudsen III Ejnar A. Knudsen III	Director	February 20, 2019
/s/ Thomas L. Manuel Thomas L. Manuel	Director	February 20, 2019
/s/ Brian D. Peterson Brian D. Peterson	Director	February 20, 2019
/s/ Alain Treuer Alain Treuer	Director	February 20, 2019

Report of Independent Registered Public Accounting Firm

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

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Green Plains Inc. and subsidiaries (the Company) as of December 31, 2018 and 2017, the related consolidated statements of income, comprehensive income, stockholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2018, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated February 20, 2019 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 4 to the consolidated financial statements, the Company has changed its method of accounting for revenue recognition in 2018 due to the adoption of ASC Topic 606, Revenue from Contracts with Customers, and all related amendments.

Basis for Opinion

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

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting

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principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ KPMG LLP

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

Omaha, Nebraska
February 20, 2019

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GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

(in thousands, except share amounts)

	December 31,	
	2018	2017
ASSETS		
Current assets		
Cash and cash equivalents	\$ 251,683	\$ 266,651
Restricted cash	66,512	45,709
Accounts receivable, net of allowances of \$194 and \$217, respectively	100,361	151,122
Income taxes receivable	12,418	6,413
Inventories	734,883	711,878
Prepaid expenses and other	14,470	17,808
Derivative financial instruments	26,315	6,890
Total current assets	1,206,642	1,206,471
Property and equipment, net	886,576	1,176,707
Goodwill	34,689	182,879
Other assets	88,525	218,593
Total assets	\$ 2,216,432	\$ 2,784,650
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities		
Accounts payable	\$ 156,901	\$ 205,479
Accrued and other liabilities	58,973	63,886
Derivative financial instruments	24,776	12,884
Income taxes payable	-	9,909
Short-term notes payable and other borrowings	538,243	526,180
Current maturities of long-term debt	54,807	67,923
Total current liabilities	833,700	886,261
Long-term debt	298,190	767,396
Deferred income taxes	10,123	56,801

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Other liabilities	11,430	15,056
Total liabilities	1,153,443	1,725,514

Commitments and contingencies (Note 18)

Stockholders' equity

Common stock, \$0.001 par value; 75,000,000 shares authorized; 46,637,549 and

46,410,405 shares issued, and 41,101,975 and 41,084,463 shares

outstanding, respectively	47	46
Additional paid-in capital	696,222	685,019
Retained earnings	324,728	325,411
Accumulated other comprehensive loss	(16,016)	(13,110)
Treasury stock, 5,535,574 and 5,325,942 shares, respectively	(58,162)	(55,184)
Total Green Plains stockholders' equity	946,819	942,182
Noncontrolling interests	116,170	116,954
Total stockholders' equity	1,062,989	1,059,136
Total liabilities and stockholders' equity	\$ 2,216,432	\$ 2,784,650

See accompanying notes to the consolidated financial statements.

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GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF INCOME

(in thousands, except per share amounts)

	Year Ended December 31,		
	2018	2017	2016
Revenues			
Product revenues	\$ 3,836,872	\$ 3,589,981	\$ 3,402,579
Service revenues	6,481	6,185	8,302
Total revenues	3,843,353	3,596,166	3,410,881
Costs and expenses			
Cost of goods sold (excluding depreciation and amortization expenses reflected below)	3,627,633	3,301,587	3,096,079
Operations and maintenance expenses	30,844	33,448	34,211
Selling, general and administrative expenses	115,878	112,024	104,677
Gain on sale of assets, net	(150,351)	-	-
Depreciation and amortization expenses	103,619	107,361	84,226
Total costs and expenses	3,727,623	3,554,420	3,319,193
Operating income	115,730	41,746	91,688
Other income (expense)			
Interest income	3,108	1,597	1,541
Interest expense	(101,025)	(90,160)	(51,851)
Other, net	2,195	3,666	(3,027)
Total other expense	(95,722)	(84,897)	(53,337)
Income (loss) before income taxes	20,008	(43,151)	38,351
Income tax benefit (expense)	16,726	124,782	(7,860)
Net income	36,734	81,631	30,491
Net income attributable to noncontrolling interests	20,811	20,570	19,828
Net income attributable to Green Plains	\$ 15,923	\$ 61,061	\$ 10,663
Earnings per share:			
Net income attributable to Green Plains - basic	\$ 0.39	\$ 1.56	\$ 0.28

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Net income attributable to Green Plains - diluted	\$ 0.39	\$ 1.47	\$ 0.28
Weighted average shares outstanding:			
Basic	40,320	39,247	38,318
Diluted	41,254	50,240	38,573
Cash dividend declared per share	\$ 0.48	\$ 0.48	\$ 0.40

See accompanying notes to the consolidated financial statements.

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GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

(in thousands)

	Year Ended December 31,		
	2018	2017	2016
Net income	\$ 36,734	\$ 81,631	\$ 30,491
Other comprehensive income (loss), net of tax:			
Unrealized losses on derivatives arising during period, net of tax (expense) benefit of \$2,854, \$2,967, and \$10,494, respectively	(6,788)	(5,048)	(18,744)
Reclassification of realized (gains) losses on derivatives, net of tax expense (benefit) of \$(2,887), \$2,306, and \$(8,830), respectively	6,669	(3,925)	15,772
Total other comprehensive loss, net of tax	(119)	(8,973)	(2,972)
Comprehensive income	36,615	72,658	27,519
Comprehensive income attributable to noncontrolling interests	20,811	20,570	19,828
Comprehensive income attributable to Green Plains	\$ 15,804	\$ 52,088	\$ 7,691

See accompanying notes to the consolidated financial statements.

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GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(in thousands)

	Common Stock Shares	Additional Paid-in Capital Amount	Retained Earnings	Accum. Other Comp. Income (Loss)	Treasury Shares	Stock Amount	Total Green Plains Stockholder Equity	Non- Control. Interests	Total Stockholders' Equity
Balance, December 31, 2015	45,282	\$ 45,577,787	\$ 290,974	\$ (1,165)	7,392	\$ (69,811)	\$ 797,830	\$ 161,079	\$ 958,909
Net income	-	-	10,663	-	-	-	10,663	19,828	30,491
Cash dividends and distributions declared	-	-	(18,423)	-	-	-	(18,423)	(18,855)	(37,278)
Other comp. loss before reclassification	-	-	-	(18,744)	-	-	-	-	-
Amounts reclassified from accum. other comp. loss	-	-	-	15,772	-	-	-	-	-
Other comp. loss, net of tax	-	-	-	(2,972)	-	-	(2,972)	-	(2,972)
Transfer of assets to Green Plains Partners LP	-	-	47,390	-	-	-	47,390	(47,390)	-
Consolidation of BioProcess Algae	-	-	-	-	-	-	-	2,807	2,807
Investment in BioProcess Algae	-	-	928	-	-	-	928	(928)	-
	-	-	-	-	323	(6,005)	(6,005)	-	(6,005)

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Repurchase of common stock										
Issuance of 4.125% convertible notes due 2022, net of tax	-	-	24,492	-	-	-	-	24,492	-	24,492
Stock-based compensation	647	1	6,846	-	-	-	-	6,847	143	6,990
Stock options exercised	150	-	1,757	-	-	-	-	1,757	-	1,757
Balance, December 31, 2016	46,079	46	659,200	283,214	(4,137)	7,715	(75,816)	862,507	116,684	979,191
Net income	-	-	-	61,061	-	-	-	61,061	20,570	81,631
Cash dividends and distributions declared	-	-	-	(18,864)	-	-	-	(18,864)	(20,519)	(39,383)
Other comp. loss before reclassification	-	-	-	-	(5,048)	-	-	-	-	-
Amounts reclassified from accum. other comp. loss	-	-	-	-	(3,925)	-	-	-	-	-
Other comp. loss, net of tax	-	-	-	-	(8,973)	-	-	(8,973)	-	(8,973)
Repurchase of common stock	-	-	-	-	-	395	(6,724)	(6,724)	-	(6,724)
Exchange of 3.25% convertible notes due 2018	-	-	18,326	-	-	(2,784)	27,356	45,682	-	45,682
Stock-based compensation	326	-	7,443	-	-	-	-	7,443	219	7,662
Stock options exercised	5	-	50	-	-	-	-	50	-	50
Balance, December 31, 2017	46,410	46	685,019	325,411	(13,110)	5,326	(55,184)	942,182	116,954	1,059,136
Reclassification of certain tax effects from other comprehensive loss (Note 1)	-	-	-	2,787	(2,787)	-	-	-	-	-
Balance, January 1, 2018	46,410	46	685,019	328,198	(15,897)	5,326	(55,184)	942,182	116,954	1,059,136
Net income	-	-	-	15,923	-	-	-	15,923	20,811	36,734

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Cash dividends and distributions declared	-	-	-	(19,393)	-	-	-	(19,393)	(21,872)	(41,265)
Other comp. loss before reclassification	-	-	-	-	(6,788)	-	-	-	-	-
Amounts reclassified from accum. other comp. loss	-	-	-	-	6,669	-	-	-	-	-
Other comp. loss, net of tax	-	-	-	-	(119)	-	-	(119)	-	(119)
Repurchase of common stock	-	-	-	-	-	210	(2,979)	(2,979)	-	(2,979)
Modification of 3.25% convertible notes due 2019	-	-	3,480	-	-	-	-	3,480	-	3,480
Exchange of 3.25% convertible notes due 2018	-	-	-	-	-	-	1	1	-	1
Stock-based compensation	213	1	7,573	-	-	-	-	7,574	277	7,851
Stock options exercised	15	-	150	-	-	-	-	150	-	150
Balance, December 31, 2018	46,638	\$ 47	\$ 696,222	\$ 324,728	\$ (16,016)	5,536	\$ (58,162)	\$ 946,819	\$ 116,170	\$ 1,062,989

See accompanying notes to the consolidated financial statements.

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GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)

	Year Ended December 31,		
	2018	2017	2016
Cash flows from operating activities:			
Net income	\$ 36,734	\$ 81,631	\$ 30,491
Adjustments to reconcile net income to net cash provided by (used in) operating activities:			
Depreciation and amortization	103,619	107,361	84,226
Amortization of debt issuance costs and debt discount	14,311	14,758	11,488
Loss on exchange of 3.25% convertible notes due 2018	-	1,291	-
Write-off of deferred financing fees related to extinguishment of debt	13,178	9,460	-
Gain on the disposal of assets	(150,351)	-	-
Gain from insurance proceeds	(2,591)	(3,250)	-
Deferred income taxes	(24,484)	(81,077)	4,910
Stock-based compensation	11,420	12,161	9,491
Undistributed equity in loss of affiliates	595	274	3,055
Other	(11,612)	(7,869)	-
Changes in operating assets and liabilities before effects of business combinations and dispositions:			
Accounts receivable	39,695	3,624	(36,888)
Inventories	31,284	(268,219)	(42,012)
Derivative financial instruments	(7,709)	(20,522)	(11,393)
Prepaid expenses and other assets	1,848	(794)	(4,092)

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Accounts payable and accrued liabilities	(49,929)	6,500	49,077
Current income taxes	31,991	(40,866)	(1,887)
Other	968	3,374	4,235
Net cash provided by (used in) operating activities	38,967	(182,163)	100,701
Cash flows from investing activities:			
Purchases of property and equipment, net	\$ (44,187)	\$ (46,467)	\$ (58,113)
Proceeds from the sale of assets, net	671,650	-	-
Acquisition of businesses, net of cash acquired	(124,407)	(61,727)	(508,143)
Investments in unconsolidated subsidiaries	(3,091)	(20,286)	(6,342)
Other investing activities	7,500	-	-
Net cash provided by (used in) investing activities	507,465	(128,480)	(572,598)
Cash flows from financing activities:			
Proceeds from the issuance of long-term debt	\$ 83,100	\$ 570,600	\$ 524,000
Payments of principal on long-term debt	(576,427)	(510,209)	(106,803)
Proceeds from short-term borrowings	3,897,225	4,385,446	4,130,946
Payments on short-term borrowings	(3,892,438)	(4,150,994)	(4,066,968)
Cash payment for exchange of 3.25% convertible notes due 2018	-	(8,523)	-
Payments for repurchase of common stock	(2,978)	(6,724)	(6,005)
Payments of cash dividends and distributions	(41,265)	(39,383)	(37,278)
Payment penalty on early extinguishment of debt	-	(2,881)	-
Payments of loan fees	(4,395)	(16,671)	(12,053)
Payments related to tax withholdings for stock-based compensation	(3,569)	(4,499)	(2,206)
Proceeds from exercises of stock options	150	50	1,757
Net cash provided by (used in) financing activities	(540,597)	216,212	425,390
Net change in cash and cash equivalents	5,835	(94,431)	(46,507)
Cash and cash equivalents, beginning of period	312,360	406,791	453,298
Cash and cash equivalents, end of period	\$ 318,195	\$ 312,360	\$ 406,791

Continued on the following page

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GREEN PLAINS INC. AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)

Continued from the previous page

	Year Ended December 31,		
	2018	2017	2016
Reconciliation of total cash, cash equivalents and restricted cash:			
Cash and cash equivalents	\$ 251,683	\$ 266,651	\$ 304,211
Restricted cash	66,512	45,709	102,580
Total cash, cash equivalents and restricted cash	\$ 318,195	\$ 312,360	\$ 406,791
Non-cash financing activity:			
Modification of 3.25% convertible notes due 2019, net	\$ 3,480	\$ -	\$ -
Exchange of 3.25% convertible notes due 2018 for shares of common stock	\$ -	\$ 47,743	\$ -
Exchange of common stock held in treasury stock for 3.25% convertible notes due 2018	\$ 1	\$ 27,356	\$ -
Supplemental disclosures of cash flow:			
Cash paid (refunded) for income taxes	\$ (22,478)	\$ (3,768)	\$ 4,692
Cash paid for interest	\$ 73,145	\$ 54,213	\$ 38,245
Supplemental investing and financing activities:			
Assets acquired in acquisitions and mergers, net of cash	\$ 124,525	\$ 63,670	\$ 568,383
Less: liabilities assumed	(118)	(1,943)	(57,433)
Less: allocation of noncontrolling interest in consolidation of BioProcess Algae	-	-	(2,807)

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Net assets acquired	\$ 124,407	\$ 61,727	\$ 508,143
Assets disposed of in sale	\$ 550,648	\$ -	\$ -
Less: liabilities disposed	(41,276)	-	-
Net assets disposed	\$ 509,372	\$ -	\$ -

See accompanying notes to the consolidated financial statements.

GREEN PLAINS INC. AND SUBSIDIARIES

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. BASIS OF PRESENTATION and DESCRIPTION OF BUSINESS

References to the Company

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

Consolidated Financial Statements

The consolidated financial statements include the company’s accounts and all significant intercompany balances and transactions are eliminated. Unconsolidated entities are included in the financial statements on an equity basis. As of December 31, 2018, the company owns a 49.1% limited partner interest and a 2.0% general partner interest in Green Plains Partners LP. Public investors own the remaining 48.9% limited partner interest in the partnership. The company determined that the limited partners in the partnership with equity at risk lack the power, through voting rights or similar rights, to direct the activities that most significantly impact partnership’s economic performance; therefore, the partnership is considered a variable interest entity. The company, through its ownership of the general partner interest in the partnership, has the power to direct the activities that most significantly affect economic performance and is obligated to absorb losses and has the right to receive benefits that could be significant to the partnership. Therefore, the company is considered the primary beneficiary and consolidates the partnership in the company’s financial

statements. The assets of the partnership cannot be used by the company for general corporate purposes. The partnership's consolidated total assets as of December 31, 2018 and 2017 are \$67.3 million and \$74.9 million, respectively, and primarily consist of property and equipment and goodwill. The partnership's consolidated total liabilities as of December 31, 2018 and 2017 are \$152.9 million and \$153.0 million, respectively, which primarily consist of long-term debt as discussed in Note 12 – Debt. The liabilities recognized as a result of consolidating the partnership do not represent additional claims on our general assets. The company also owns a 90.0% interest in BioProcess Algae, a joint venture formed in 2008, and consolidates their results in its consolidated financial statements.

Reclassifications

Certain prior year amounts have been reclassified to conform to the current year presentation. These reclassifications did not affect total revenues, costs and expenses, net income or stockholders' equity.

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 revenue recognition, depreciation of property and equipment, carrying value of intangible assets, impairment of long-lived assets and goodwill, derivative financial instruments, accounting for income taxes and assets acquired and liabilities assumed in acquisitions, are impacted significantly by judgments, assumptions and estimates used in the preparation of the consolidated financial statements.

Description of Business

The company operates within four business segments: (1) ethanol production, which includes the production of ethanol and distillers grains, and recovery of 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, (3) food and ingredients, which includes cattle feeding and food-grade corn oil operations and included vinegar production until the sale of Fleischmann's Vinegar during the fourth quarter of 2018 and (4) partnership, which includes fuel storage and transportation services.

Ethanol Production Segment

Green Plains is one of the largest ethanol producers in North America. The company operates 13 ethanol plants in seven states through separate wholly owned operating subsidiaries. The company's ethanol plants use a dry mill process to produce ethanol and co-products such as wet, modified wet or dried distillers grains, as well as corn oil. The corn oil systems are designed to extract non-edible corn oil from the whole stillage immediately prior to production of distillers grains. At capacity, the company expects to process approximately 387 million bushels of corn and produce approximately 1.1 billion gallons of ethanol, 2.9 million tons of distillers grains and 292 million pounds of industrial grade corn oil annually.

Agribusiness and Energy Services Segment

The company owns and operates grain handling and storage assets through its agribusiness and energy services segment, which has grain storage capacity of approximately 47.2 million bushels, with 37.1 million bushels of storage capacity at the company's ethanol plants and 10.1 million bushels of total storage capacity at its four grain elevators. The company's agribusiness operations provide synergies with the ethanol production segment as it supplies a portion of the feedstock needed to produce ethanol. The company has an in-house marketing business that is responsible for the sale, marketing and distribution of all ethanol, distillers grains and corn oil produced at its ethanol plants. The company also purchases and sells ethanol, distillers grains, corn oil, grain, natural gas and other commodities and participates in other merchant trading activities in various markets.

Food and Ingredients Segment

The company owns six cattle feeding operations with the capacity to support approximately 355,000 head of cattle and grain storage capacity of approximately 11.7 million bushels. The company also has food-grade corn oil operations which focuses on shipping corn oil from facilities across the Midwest by rail or barge to terminal facilities located in the southern United States. Until its sale on November 27, 2018, the company also owned Fleischmann's Vinegar, which is one of the world's largest producers of food-grade industrial vinegar.

Partnership Segment

The company's partnership segment provides fuel storage and transportation services by owning, operating, developing and acquiring ethanol and fuel storage tanks, terminals, transportation assets and other related assets and businesses. As of December 31, 2018, the partnership owns (i) 32 ethanol storage facilities located at or near the company's 13 operational ethanol production plants and one non-operational ethanol production plant, which have the ability to efficiently and effectively store and load railcars and tanker trucks with all of the ethanol produced at the company's ethanol production plants, (ii) seven fuel terminal facilities, located near major rail lines, which enable the partnership to receive, store and deliver fuels from and to markets that seek access to renewable fuels, and (iii) transportation assets, including a leased railcar fleet of approximately 2,840 railcars which is utilized to transport ethanol from the company's ethanol production plants to refineries throughout the United States and international export terminals.

2. SUMMARY OF SIGNIFICANT accounting POLICIES

Cash and Cash Equivalents

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

Restricted Cash

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

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.

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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. Energy trading transactions are reported net as a component of revenue. 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, cattle and vinegar, 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 when 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 cattle feeding operations and vinegar production until the sale of Fleischmann's Vinegar during the fourth quarter of 2018. 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, process chemicals, cattle and veterinary supplies. Corn feedstock costs include gains and losses on related derivative financial instruments not designated as cash flow hedges, inbound freight charges, inspection costs and transfer costs, as well as reclassifications of gains and losses on cash flow hedges from accumulated other comprehensive income or loss. Plant overhead consists primarily of plant and feedlot utilities, repairs and maintenance, feedlot expenses 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 sales contracts to attempt to minimize the effect of price changes on ethanol, grain, natural gas and cattle inventories. Exchange-traded futures and options contracts are valued at quoted market prices and settled predominantly in cash. The company is exposed to loss when counterparties default on forward purchase and sale contracts. Grain inventories held for sale and forward purchase and sale contracts are valued at market prices when available or other market quotes adjusted for 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.

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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, cattle, natural gas and crude oil. 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, agribusiness and energy services, and food and ingredients segments 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. 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 other 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. Ineffectiveness of the hedges is recognized in the current period to the extent the change in fair value of the inventory is not offset by the change in fair value of the derivative.

Concentrations of Credit Risk

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

The company has master netting arrangements with various counterparties. On the consolidated balance sheets, the associated net amount for each counterparty is reflected as either an accounts receivable or accounts payable. If the amount for each counterparty were reflected on a gross basis, the company's accounts receivable and accounts payable would increase by \$13.7 million and \$23.4 million at December 31, 2018 and 2017, respectively.

Inventories

Corn held for ethanol production, ethanol, corn oil and distillers grains inventories are recorded at lower of average cost or market.

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

Raw materials and finished goods inventories are valued at the lower of average cost or market. In addition to ethanol and related co-products in process, work-in-process inventory includes the cost of acquired cattle and related feed and veterinary supplies, as well as direct labor and feedlot overhead costs, all of which are valued at lower of average cost or market.

Property and Equipment

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

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

Property and equipment is capitalized at cost. Land improvements and other property improvements are capitalized and depreciated. Costs of repairs and maintenance are charged to expense when incurred. The company periodically evaluates whether events and circumstances have occurred that warrant a revision of the estimated useful life of its fixed assets.

Intangible Assets

Our intangible assets consist of research and development technology and licenses that were capitalized at fair value at the time of consolidation of BioProcess Algae, and are being amortized over their estimated useful lives. Prior to the sale of Fleischmann's Vinegar during the fourth quarter, our intangible assets also included the vinegar trade name and customer relationships.

Impairment of Long-Lived Assets

The company reviews its long-lived assets, currently consisting of property and equipment, intangible assets and equity method investments, for impairment whenever events or changes in circumstances indicate the carrying amount of the asset may not be recoverable. Recoverability of assets to be held and used is measured by comparison of the carrying amount of an asset to estimated undiscounted future cash flows expected to be generated by the asset. If the carrying amount of an asset exceeds its estimated future cash flows, an impairment charge is recognized in the amount by which the carrying amount of the asset exceeds the fair value of the asset. Significant management judgment is required to determine the fair value of long-lived assets, which includes discounted cash flows projections. There were no material impairment charges recorded for the periods reported.

Goodwill

Goodwill is an asset representing the future economic benefits arising from other assets acquired in a business combination that are not individually identified and separately recognized. The determination of goodwill takes into consideration the fair value of net tangible and intangible assets. The company's goodwill currently consists of amounts related to the acquisition of five ethanol plants and its fuel terminal and distribution business.

Effective January 1, 2018, the company early adopted the amended guidance in ASC Topic 350, Intangibles – Goodwill and Other: Simplifying the Test for Goodwill Impairment, which simplifies the measurement of goodwill by eliminating Step 2 from the goodwill impairment test. Under the amended guidance, an entity may first assess qualitative factors to determine whether it is necessary to perform a quantitative goodwill impairment test. If determined to be necessary, the quantitative impairment test shall be used to identify goodwill impairment and measure the amount of a goodwill impairment loss to be recognized (if any).

We performed our annual goodwill assessment as of October 1, 2018, using a qualitative assessment, which resulted in no goodwill impairment.

We estimate the amount and timing of projected cash flows that will be generated by an asset over an extended period of time when we review our long-lived assets and goodwill. Circumstances that may indicate impairment include a decline in future projected cash flows, a decision to suspend plant operations for an extended period of time, sustained decline in our market capitalization or market prices for similar assets or businesses, or a significant adverse change in legal or regulatory matters or business climate. Significant management judgment is required to determine the fair value of our long-lived assets and goodwill and measure impairment, which includes projected cash flows. Fair value is determined by using various valuation techniques, including discounted cash flow models, sales of comparable properties and third-party independent appraisals. Changes in estimated fair value could result in a write-down of the asset. For additional information, please refer to Note 10 – Goodwill and Intangible Assets.

Financing Costs

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

Selling, General and Administrative Expenses

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

relations activities.

Stock-Based Compensation

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

Income Taxes

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

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

Recent Accounting Pronouncements

Effective January 1, 2018, the company adopted the amended guidance in ASC Topic 606, Revenue from Contracts with Customers. Please refer to Note 4 – Revenue for further details.

Effective January 1, 2018, the company adopted the amended guidance in ASC Topic 230, Statement of Cash Flows: Restricted Cash, which requires amounts generally described as restricted cash and restricted cash equivalents to be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. The amended guidance was applied retrospectively. As a result, net cash used in operating activities for the twelve months ended December 31, 2017, was adjusted to exclude the change in restricted cash and increased the previously reported balance by \$22.3 million. Net cash provided by financing activities for the twelve months ended December 31, 2017, was adjusted to exclude the change in restricted cash and decreased the previously reported balance by \$34.5 million. Additionally, net cash provided by operating activities for the twelve months ended December 31, 2016, was adjusted to exclude the change in restricted cash and increased the previously reported balance by \$15.5 million. Net cash provided by financing activities for the twelve months ended December 31, 2016, was adjusted to exclude the change in restricted cash and increased the previously reported balance by \$18.6 million.

Effective January 1, 2018, the company adopted the amended guidance in ASC Topic 740, Income Taxes: Intra-Entity Transfers of Assets other than Inventory, which requires the recognition of current and deferred income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs. The amended guidance is required on a modified retrospective basis, with a cumulative-effect adjustment to retained earnings as of the beginning of the year of adoption. The adoption of the guidance did not have an impact to the financial statements.

Effective January 1, 2018, the company adopted the amended guidance in ASC Topic 805, Business Combinations: Clarifying the Definition of a Business, which clarifies the definition of a business and provides guidance to assist companies and other reporting organizations evaluate whether transactions should be accounted for as acquisitions or disposals of assets or businesses. The amended guidance will be applied prospectively.

Effective January 1, 2018, the partnership early adopted the amended guidance in ASC Topic 350, Intangibles – Goodwill and Other: Simplifying the Test for Goodwill Impairment, which simplifies the measurement of goodwill by eliminating Step 2 from the goodwill impairment test. Under the amended guidance, an entity may first assess qualitative factors to determine whether it is necessary to perform a quantitative goodwill impairment test. If determined to be necessary, the quantitative impairment test shall be used to identify goodwill impairment and measure the amount of a goodwill impairment loss to be recognized (if any). The amended guidance was applied

prospectively when the annual impairment testing was performed in the current year. The new guidance did not have a material impact on the consolidated financial statements.

Effective January 1, 2018, the company early adopted the amended guidance in ASC Topic 220, Income Statement – Reporting Comprehensive Income: Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income, which allows a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act. The amendment eliminates the stranded tax effects resulting from the Tax Cuts and Jobs Act and is intended to improve the usefulness of information reported. As a result, the company recorded a \$2.8 million reclassification from accumulated other comprehensive income to retained earnings during the first quarter of 2018. It is the company’s policy to release income tax effects from accumulated other comprehensive income using the portfolio approach.

Effective January 1, 2019, the company will adopt the amended guidance in ASC Topic 842, Leases, which aims to make leasing activities more transparent and comparable, requiring substantially all leases to be recognized by lessees on the balance sheet as a right-of-use asset and corresponding lease liability, including leases currently accounted for as operating leases. The new standard is effective for fiscal years and interim periods within those years, beginning after December 15, 2018. The standard requires a modified retrospective transition approach and allows for early adoption. In July 2018, the FASB issued Accounting Standards Update, Leases (Topic 842): Targeted Improvements, which provides an option to apply the transition provisions of the new standard at adoption date instead of the earliest comparative period presented in the financial statements. The company will elect to use this optional transition method.

The company has implemented a lease accounting system, which will assist in delivering the required accounting changes and disclosures under ASC Topic 842, Leases. The company expects the adoption of the new standard to result in recognition of approximately \$60 million in right-of-use assets and lease liabilities on the company’s consolidated balance sheet, primarily due to operating leases that are currently not recognized on the balance sheet. The impact to revenue streams reported as operating lease revenue under GAAP is expected to be immaterial. The company plans to elect the lessee non-

lease component separation practical expedient to include both the lease and non-lease components as a single component and account for them as a lease. In addition, the company expects to make an accounting policy election that will keep certain leases with a term of 12 months or less off the balance sheet and result in recognizing those lease payments on a straight-line basis over the lease term.

3. GREEN PLAINS PARTNERS LP

The partnership is a fee-based master limited partnership formed by Green Plains to provide fuel storage and transportation services by owning, operating, developing and acquiring ethanol and fuel storage tanks, terminals, transportation assets and other related assets and businesses. The partnership's assets currently include (i) 32 ethanol storage facilities, located at or near the company's 13 operational ethanol production plants and one non-operational ethanol plant, which have the ability to efficiently and effectively store and load railcars and tanker trucks with all of the ethanol produced at the company's ethanol production plants, (ii) seven fuel terminal facilities, located near major rail lines, which enable the partnership to receive, store and deliver fuels from and to markets that seek access to renewable fuels, and (iii) transportation assets, including a leased railcar fleet of approximately 2,840 railcars, which are contracted to transport ethanol from the company's ethanol production plants to refineries throughout the United States and international export terminals. The partnership is the company's primary downstream logistics provider to support its approximately 1.1 bgy ethanol marketing and distribution business since the partnership's assets are the principal method of storing and delivering the ethanol the company produces.

As of December 31, 2018, the company owns a 49.1% limited partner interest, consisting of 11,586,548 common units, and a 2.0% general partner interest in the partnership. The public owns the remaining 48.9% limited partner interest in the partnership. As such, the partnership is consolidated in the company's financial statements.

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

- 10-year storage and throughput agreement, originally expiring on June 30, 2025, extended to June 30, 2028;
- 10-year rail transportation services agreement, expiring on June 30, 2025;
- 1-year trucking transportation agreement, expiring on May 31, 2019;
- Terminal services agreement for the Birmingham, Alabama unit train terminal, expiring December 31, 2019; and
- Various other terminal services agreements for other fuel terminal facilities, each with Green Plains Trade.

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

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

4. REVENUE

Adoption of ASC Topic 606

On January 1, 2018, the company adopted the amended guidance in ASC Topic 606, Revenue from Contracts with Customers, and all related amendments ("new revenue standard") and applied it to all contracts using the modified retrospective transition method. There were no adjustments to the consolidated January 1, 2018 balance sheet for the adoption of the new revenue standard. As such, comparative information has not been restated and continues to be reported under the accounting standards in effect for those periods. In addition, there was no impact of adoption on the consolidated statements of operations or balance sheets for the year ended December 31, 2018.

Revenue Recognition

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

Revenue by Source

The following table disaggregates revenue by major source for the year ended December 31, 2018 (in thousands):

	Twelve Months Ended December 31, 2018					Total
	Ethanol Production	Agribusiness & Energy Services	Food & Ingredients	Partnership	Eliminations	
Revenues:						
Revenues from contracts with customers under ASC 606:						
Ethanol	\$ 3,803	\$ -	\$ -	\$ -	\$ -	\$ 3,803
Distillers grains	195,509	-	-	-	-	195,509
Cattle and vinegar	-	-	1,007,833	-	-	1,007,833
Service revenues	-	-	-	5,180	-	5,180
Other	5,369	3,014	-	-	-	8,383
Intersegment revenues	2,914	23	156	9,030	(12,123)	-
Total revenues from contracts with customers	207,595	3,037	1,007,989	14,210	(12,123)	1,220,708
Revenues from contracts accounted for as derivatives under ASC 815 (1):						
Ethanol	1,618,319	418,956	-	-	-	2,037,275
Distillers grains	198,738	136,461	-	-	-	335,199
Corn oil	66,567	22,623	13,110	-	-	102,300
Grain	520	73,754	-	-	-	74,274
Cattle and vinegar	-	-	(15,906)	-	-	(15,906)
Other	20,254	67,948	-	-	-	88,202
Intersegment revenues	8,668	46,177	-	-	(54,845)	-

Total revenues from contracts accounted for as derivatives	1,913,066	765,919	(2,796)	-	(54,845)	2,621,344
Leasing revenues under ASC 840 (2)	-	-	-	86,538	(85,237)	1,301
Total Revenues	\$ 2,120,661	\$ 768,956	\$ 1,005,193	\$ 100,748	\$ (152,205)	\$ 3,843,353

- (1) Revenues from contracts accounted for as derivatives represent physically settled derivative sales that are outside the scope of ASC 606, Revenue from Contracts with Customers (ASC 606), where the company recognizes revenue when control of the inventory is transferred within the meaning of ASC 606 as required by ASC 610-20, Gains and Losses from the Derecognition of Nonfinancial Assets.
- (2) Leasing revenues do not represent revenues recognized from contracts with customers under ASC 606, and continue to be accounted for under ASC 840, Leases.

Payment Terms

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

Contract Liabilities

The company records unearned revenue when consideration is received, or such consideration is unconditionally due, from a customer prior to transferring goods or services to the customer under the terms of service and lease agreements. Unearned revenue from service agreements, which represents a contract liability, is recorded for fees that have been charged to the customer prior to the completion of performance obligations. Unearned revenue is generally recognized in the subsequent quarter and are not material to the company. The company expects to recognize all of the unearned revenue associated with service agreements as of December 31, 2018, in the subsequent quarter when the inventory is withdrawn from the partnership's tank storage.

Practical Expedients

Under the new revenue standard, companies may elect various practical expedients upon adoption. As a result, the company elected to recognize the cost for shipping and handling activities that occur after the customer obtains control of the promised goods as fulfillment activities and not when performance obligations are met. The company also elected to exclude sales taxes from transaction prices.

5. ACQUISITIONS AND DISPOSITIONS

ACQUISITIONS

Acquisition of Cattle Feeding Operations – Bartlett Cattle Company, L.P.

On August 1, 2018, the company acquired two cattle-feeding operations from Bartlett Cattle Company, L.P. for \$16.2 million, plus working capital of approximately \$106.6 million primarily consisting of work-in-process inventory. The transaction included the feed yards located in Sublette, Kansas and Tulia, Texas, which added combined feedlot capacity of 97,000 head of cattle to the company's operations. The transaction was financed using cash on hand and proceeds from the Green Plains Cattle senior secured asset-based revolving credit facility. There were no material acquisition costs recorded for the acquisition.

The following is a summary of the preliminary purchase price of assets acquired and liabilities assumed (in thousands):

Amounts of Identifiable Assets Acquired and Liabilities Assumed	
Accounts receivable	\$ 1,897

Inventory	104,809
Property and equipment, net	16,190
Current liabilities	(118)
Total identifiable \$ net assets	122,778

The amounts above reflect a working capital payment by the company of \$0.9 million made during 2018.

Acquisition of Cattle Feeding Operations – Cargill Cattle Feeders, LLC

On May 16, 2017, the company acquired two cattle-feeding operations from Cargill Cattle Feeders, LLC for \$59.3 million, including certain working capital adjustments. The transaction included the feed yards located in Leoti, Kansas and Eckley, Colorado, which added combined feedlot capacity of 155,000 head of cattle to the company's operations. The transaction was financed using cash on hand. There were no material acquisition costs recorded for the acquisition.

As part of the transaction, the company also entered into a long-term cattle supply agreement with Cargill Meat Solutions Corporation. Under the cattle supply agreement, all cattle placed in the Leoti and Eckley feedlots are sold exclusively to Cargill Meat Solutions under an agreed upon pricing arrangement.

The following is a summary of the assets acquired and liabilities assumed (in thousands):

Amounts of Identifiable Assets Acquired and Liabilities Assumed	
Inventory	\$ 22,450
Prepaid expenses and other	52
	36,960

Property and
equipment,
net

Current
liabilities (180)

Total
identifiable \$
net assets 59,282

The amounts above reflect the final purchase price allocation, which included working capital true-up payments by the company of \$1.6 million made during 2018.

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Acquisition of Fleischmann's Vinegar

On October 3, 2016, the company acquired all of the issued and outstanding stock of SCI Ingredients, the holding company of Fleischmann's Vinegar, for \$258.3 million in cash. Fleischmann's Vinegar is one of the world's largest producers of food-grade industrial vinegar. The company recorded \$2.3 million of acquisition costs for Fleischmann's Vinegar to selling, general and administrative expenses during the year ended December 31, 2016. The operating results of Fleischmann's Vinegar have been included in the company's consolidated financial statements since October 4, 2016.

The following is a summary of the assets acquired and liabilities assumed (in thousands):

Amounts of Identifiable Assets Acquired and Liabilities Assumed	
Cash	\$ 4,148
Inventory	9,308
Accounts receivable, net	13,919
Prepaid expenses and other	1,054
Property and equipment	49,175
Intangible assets	90,500
Current liabilities	(9,689)
Income taxes payable	(216)

Deferred tax liabilities	(41,882)
Total identifiable net assets	116,317
Goodwill	142,002
Purchase price	\$ 258,319

Acquisition of Abengoa Ethanol Plants

On September 23, 2016, the company acquired three ethanol plants located in Madison, Illinois, Mount Vernon, Indiana, and York, Nebraska from subsidiaries of Abengoa S.A. for approximately \$234.9 million for the ethanol plant assets, and \$19.1 million for working capital acquired and liabilities assumed, subject to certain post-closing adjustments. These ethanol facilities have a combined annual production capacity of 230 mmgy. The company recorded \$1.3 million of acquisition costs for the Abengoa ethanol plants to selling, general and administrative expenses during the year ended December 31, 2016. The operating results of Abengoa ethanol plants have been included in the company's consolidated financial statements since September 23, 2016.

The following is a summary of assets acquired and liabilities assumed (in thousands):

Amounts of Identifiable Assets Acquired and Liabilities Assumed	
Inventory	\$ 16,904
Accounts receivable, net	1,826
Prepaid expenses and other	2,224
Property and equipment	234,947
Other assets	3,885

Current maturities of long-term debt	(406)
Current liabilities	(2,580)
Long-term debt	(2,763)
Total identifiable net assets	\$ 254,037

Concurrently with the company's acquisition of the Abengoa ethanol plants, on September 23, 2016, the partnership acquired the storage assets of the Abengoa ethanol plants from the company for \$90.0 million in a transfer between entities under common control and entered into amendments to the related commercial agreements with Green Plains Trade.

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DISPOSITIONS

Disposition of Fleischmann's Vinegar

On November 27, 2018, the company and Green Plains II LLC, an indirect wholly-owned subsidiary of the company, completed the sale of Fleischmann's Vinegar Company, Inc. to Kerry Holding Co. ("Kerry"). The company received as consideration from Kerry \$353.9 million in cash and restricted cash, including net working capital adjustments. The divested assets were reported within the company's food and ingredients segment. The company recorded a pre-tax gain on the sale of Fleischmann's Vinegar of \$58.2 million, including offsetting related transaction costs of \$7.4 million within the corporate segment.

The assets and liabilities of Fleischmann's Vinegar at closing on November 27, 2018 were as follows (in thousands):

Amounts of Identifiable	
Assets Disposed and	
Liabilities Relinquished	
Cash	\$ 2,107
Accounts	
receivable,	
net	15,935
Inventory	15,167
Prepaid	
expenses	
and	
other	853
Property	
and	
equipment	64,552
Other	
assets	79,389
Current	
liabilities	(8,587)
	(26,617)

Deferred tax liabilities	
Total identifiable net assets	142,799
Goodwill	142,002
Net assets disposed	\$ 284,801

The amounts reflected above represent working capital estimates which are considered preliminary until contractual post-closing working capital adjustments are finalized.

Disposition of Bluffton, Lakota and Riga Ethanol Plants

On November 15, 2018, the company completed the sale of three ethanol plants located in Bluffton, Indiana, Lakota, Iowa, and Riga, Michigan, and certain related assets from subsidiaries, to Valero Renewable Fuels Company, LLC (“Valero”) for the sale price of \$319.8 million, including preliminary net working capital and other adjustments.

Correspondingly, the partnership’s storage assets located adjacent to such plants were sold to Green Plains Inc. for \$120.9 million. The company received as consideration from Valero approximately \$319.8 million, while the partnership received as consideration from the company 8.7 million partnership units and a portion of the general partner interest equating to 0.2 million equivalent limited partner units to maintain the general partner’s 2% interest. In addition, the partnership also received additional consideration of approximately \$2.7 million from Valero for the assignment of certain railcar operating leases. The divested assets were reported within the company’s ethanol production, agribusiness and energy services and partnership segments. The company recorded a pre-tax gain on the sale of the three ethanol plants of \$92.2 million, of which \$89.5 million was recorded within the corporate segment and \$2.7 million was recorded within the partnership segment, including offsetting transaction costs of \$4.2 million, of which \$3.7 million were recorded within the corporate segment and \$0.5 million were recorded within the partnership segment.

The assets and liabilities of the Bluffton, Lakota and Riga ethanol plants at closing on November 15, 2018 were as follows (in thousands):

Amounts of Identifiable Assets Disposed and Liabilities Relinquished	
Inventory	\$ 37,227
Prepaid expenses and other	542
Property and equipment	184,969
Other assets	1,717
Current liabilities	(1,366)
Other liabilities	(4,706)
Total identifiable net assets	218,383
Goodwill	6,188
Net assets disposed	\$ 224,571

The amounts reflected above represent working capital estimates which are considered preliminary until contractual post-closing working capital adjustments are finalized. The company recorded a receivable of \$3.1 million as of December 31, 2018 to reflect the estimated working capital true-up primarily related to additional inventory transferred.

The company determined that the dispositions noted above did not meet the criteria for discontinued operations presentation as the disposition of these businesses did not represent a strategic shift that will have a major effect on its operations and financial results.

6. FAIR VALUE DISCLOSURES

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

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

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

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.

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

	Fair Value Measurements at December 31, 2018		
	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Total
Assets:			
Cash and cash equivalents	\$ 251,683	\$ -	\$ 251,683
Restricted cash	66,512	-	66,512
Inventories carried at market	-	111,960	111,960
Unrealized gains on derivatives	-	9,976	9,976
Other assets	114	1	115
Total assets measured at fair value	\$ 318,309	\$ 121,937	\$ 440,246
Liabilities:			
Accounts payable (1)	\$ -	\$ 16,573	\$ 16,573
Unrealized losses on derivatives	-	7,852	7,852
Other liabilities	-	2	2
Total liabilities measured at fair value	\$ -	\$ 24,427	\$ 24,427

Fair Value Measurements at
December 31, 2017
Quoted Prices in
Significant Other

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	Active Markets for Identical Assets (Level 1)	Observable Inputs (Level 2)	Total
Assets:			
Cash and cash equivalents	\$ 266,651	\$ -	\$ 266,651
Restricted cash	45,709	-	45,709
Inventories carried at market	-	26,834	26,834
Unrealized gains on derivatives	-	12,045	12,045
Other assets	115	-	115
Total assets measured at fair value	\$ 312,475	\$ 38,879	\$ 351,354
Liabilities:			
Accounts payable (1)	\$ -	\$ 37,401	\$ 37,401
Unrealized losses on derivatives	-	12,884	12,884
Other liabilities	-	92	92
Total liabilities measured at fair value	\$ -	\$ 50,377	\$ 50,377

(1) Accounts payable is generally stated at historical amounts with the exception of \$16.6 million and \$37.4 million at December 31, 2018 and 2017, 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.

The company believes the fair value of its debt approximated book value, which was approximately \$891.2 million at December 31, 2018, and \$1.4 billion at December 31, 2017. The company estimated the fair value of its outstanding debt using Level 2 inputs. The company believes the fair values of its accounts receivable approximated book value, which was \$100.4 million and \$151.1 million, respectively, at December 31, 2018 and 2017.

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

7. SEGMENT INFORMATION

The company reports the financial and operating performance for the following four operating segments: (1) ethanol production, which includes the production of ethanol, distillers grains 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 and other commodities, (3) food and ingredients, which includes cattle feeding and food-grade corn oil operations and included vinegar production until the sale of Fleischmann's Vinegar during the fourth quarter of 2018 and (4) 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 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):

	Year Ended December 31,		
	2018	2017	2016
Revenues:			
Ethanol production:			
Revenues from external customers (1)	\$ 2,109,079	\$ 2,497,360	\$ 2,409,102
Intersegment revenues	11,582	10,313	-
Total segment revenues	2,120,661	2,507,673	2,409,102
Agribusiness and energy services:			
Revenues from external customers (1)	722,756	621,223	675,446

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Intersegment revenues	46,200	47,538	34,461
Total segment revenues	768,956	668,761	709,907
Food and ingredients:			
Revenues from external customers (1)	1,005,037	471,398	318,031
Intersegment revenues	156	383	150
Total segment revenues	1,005,193	471,781	318,181
Partnership:			
Revenues from external customers	6,481	6,185	8,302
Intersegment revenues	94,267	100,808	95,470
Total segment revenues	100,748	106,993	103,772
Revenues including intersegment activity	3,995,558	3,755,208	3,540,962
Intersegment eliminations	(152,205)	(159,042)	(130,081)
Revenues as reported	\$ 3,843,353	\$ 3,596,166	\$ 3,410,881

(1) Revenues from external customers include realized gains and losses from derivative financial instruments.

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

	Year Ended December 31,		
	2018	2017	2016
Cost of goods sold:			
Ethanol production	\$ 2,118,787	\$ 2,434,001	\$ 2,280,906
Agribusiness and energy services	717,772	614,582	650,538
Food and ingredients	939,838	411,781	294,396
Partnership	-	-	-
Intersegment eliminations	(148,764)	(158,777)	(129,761)
	\$ 3,627,633	\$ 3,301,587	\$ 3,096,079

	Year Ended December 31,		
	2018	2017	2016
Operating income (loss):			
Ethanol production	\$ (111,823)	\$ (45,074)	\$ 28,125
Agribusiness and energy services	29,076	30,443	34,039
Food and ingredients	40,130	35,961	16,436
Partnership	64,770	65,709	60,903
Intersegment eliminations	(3,110)	(61)	(170)
Corporate activities	96,687	(45,232)	(47,645)
	\$ 115,730	\$ 41,746	\$ 91,688

	Year Ended December 31,		
	2018	2017	2016
EBITDA:			
Ethanol production	\$ (31,623)	\$ 40,069	\$ 97,113
Agribusiness and energy services	31,583	33,906	34,209
Food and ingredients	55,805	49,803	20,190
Partnership	69,399	71,041	66,633
Intersegment eliminations	(3,110)	(61)	(732)
Corporate activities	102,598	(40,388)	(42,985)
	\$ 224,652	\$ 154,370	\$ 174,428

	Year Ended December 31,		
	2018	2017	2016
Depreciation and amortization:			
Ethanol production	\$ 80,227	\$ 81,987	\$ 68,746
Agribusiness and energy services	2,470	3,462	2,536
Food and ingredients	12,914	13,103	3,705
Partnership	4,442	5,111	5,647
Corporate activities	3,566	3,698	3,592
	\$ 103,619	\$ 107,361	\$ 84,226

Year Ended December 31,

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	2018	2017	2016
Capital expenditures:			
Ethanol production	\$ 27,322	\$ 28,996	\$ 39,555
Agribusiness and energy services	277	397	2,340
Food and ingredients	15,452	17,772	2,479
Partnership	1,268	2,024	400
Corporate activities	451	3,115	11,638
	\$ 44,770	\$ 52,304	\$ 56,412

The following table reconciles net income to EBITDA (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Net income:	\$ 36,734	\$ 81,631	\$ 30,491
Interest expense	101,025	90,160	51,851
Income tax expense (benefit)	(16,726)	(124,782)	7,860
Depreciation and amortization	103,619	107,361	84,226
EBITDA	\$ 224,652	\$ 154,370	\$ 174,428

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

	Year Ended December 31,	
	2018	2017
Total assets:		
Ethanol production	\$ 872,845	\$ 1,144,459
Agribusiness and energy services	399,633	554,981
Food and ingredients	552,459	725,232
Partnership	67,297	74,935
Corporate assets	334,236	295,217
Intersegment eliminations	(10,038)	(10,174)
	\$ 2,216,432	\$ 2,784,650

(1) Asset balances by segment exclude intercompany payable and receivable balances.

8. INVENTORIES

Inventories are carried at the lower of cost or net realizable value, except grain held for sale and fair-value hedged inventories. Commodities held for sale are reported at market value. As of December 31, 2018, the company recorded a \$6.0 million lower of cost or market inventory adjustment reflected in cost of goods sold within the ethanol production segment.

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

	December 31,	
	2018	2017
Finished goods	\$ 99,765	\$ 146,269
Commodities held for sale	62,980	65,693
Raw materials	119,014	144,520
Work-in-process	423,840	320,664
Supplies and parts	29,284	34,732
	\$ 734,883	\$ 711,878

9. PROPERTY AND EQUIPMENT

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

	December 31,	
	2018	2017
Plant equipment	\$ 931,321	\$ 1,232,724
Buildings and improvements	176,279	212,426
Land and improvements	115,503	136,274
Railroad track and equipment	34,163	42,149
Construction-in-progress	12,484	17,019
Computer hardware and software	19,082	19,653
Office furniture and equipment	3,733	3,854
Leasehold improvements and other	24,416	27,193
Total property and equipment	1,316,981	1,691,292
Less: accumulated depreciation and amortization	(430,405)	(514,585)
Property and equipment, net	\$ 886,576	\$ 1,176,707

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10. GOODWILL AND INTANGIBLE ASSETS

Goodwill

The company currently has two reporting units, to which goodwill is assigned. For the year ended December 31, 2017, the company determined a step one analysis was appropriate due to the passage of time since the last quantitative analysis was performed. A cash flow and valuation analysis was performed to estimate the fair value of each reporting unit. Significant assumptions inherent in the valuation methodologies for goodwill are employed and include, but are not limited to, prospective financial information, growth rates, discount rates, inflationary factors, and cost of capital. Based on this quantitative test, we determined that the fair value of each reporting unit exceeded its carrying amount and, therefore, step two of the two-step goodwill impairment test was unnecessary.

Effective January 1, 2018, the company early adopted the amended guidance in ASC Topic 350, Intangibles – Goodwill and Other: Simplifying the Test for Goodwill Impairment, which simplifies the measurement of goodwill by eliminating Step 2 from the goodwill impairment test. Under the amended guidance, an entity may first assess qualitative factors to determine whether it is necessary to perform a quantitative goodwill impairment test. If determined to be necessary, the quantitative impairment test shall be used to identify goodwill impairment and measure the amount of a goodwill impairment loss to be recognized (if any).

The annual goodwill impairment review for the year ended December 31, 2018, was a qualitative assessment that showed no indications of impairment.

Changes in the carrying amount of goodwill attributable to each business segment during the years ended December 31, 2018 and 2017 were as follows (in thousands):

	Ethanol Production	Food and Ingredients	Partnership	Total
Balance, December 31, 2016	\$ 30,279	\$ 142,819	\$ 10,598	\$ 183,696
Adjustment to preliminary Fleischmann's Vinegar valuation	-	(817)	-	(817)
Balance, December 31, 2017	\$ 30,279	\$ 142,002	\$ 10,598	\$ 182,879
Dispositions	(6,188)	(142,002)	-	(148,190)
Balance, December 31, 2018	\$ 24,091	\$ -	\$ 10,598	\$ 34,689

As of December 31, 2018, in connection with the sale of the Bluffton, Lakota and Riga ethanol plants and Fleischmann's Vinegar, the fair value of goodwill was reduced by \$6.2 million and \$142.0 million, respectively.

Intangible Assets

As of November 27, 2018, the company's customer relationship intangible asset recognized in connection with the Fleischmann's Vinegar acquisition of \$68.9 million, net of \$11.1 million of amortization, was disposed of in connection with the Fleischmann's Vinegar sale. As of November 27, 2018, the company's indefinite-lived trade name intangible asset of \$10.5 million was disposed of as part of the Fleischmann's Vinegar sale. Prior to its disposition, the company recognized \$4.4 million, \$5.3 million and \$1.4 million, respectively, of amortization expense associated with amortizing the customer relationship intangible asset during the years ended December 31, 2018, 2017 and 2016.

11. DERIVATIVE FINANCIAL INSTRUMENTS

At December 31, 2018, the company's consolidated balance sheet reflected unrealized losses of \$16.0 million, net of tax, in accumulated other comprehensive loss. The company expects these losses will be reclassified as operating income over the next 12 months as a result of hedged transactions that are forecasted to occur. The amount realized in operating income will differ as commodity prices change.

Fair Values of Derivative Instruments

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

	Asset Derivatives'		Liability Derivatives'	
	Fair Value at December 31, 2018	2017	Fair Value at December 31, 2018	2017
Derivative financial instruments	\$ 9,976 (1)	\$ 12,045 (2)	\$ 7,852 (3)	\$ 12,884
Other assets	1	-	-	-
Other liabilities	-	-	2	92
Total	\$ 9,977	\$ 12,045	\$ 7,854	\$ 12,976

- (1) At December 31, 2018, derivative financial instruments, as reflected on the balance sheet, includes net unrealized gains on exchange traded futures and options contracts of \$16.3 million.
- (2) At December 31, 2017, derivative financial instruments, as reflected on the balance sheet, includes net unrealized gains on exchange traded futures and options contracts of \$8.5 million, which included \$0.3 million of net unrealized gains on derivative financial instruments designated as cash flow hedging instruments.
- (3) At December 31, 2018, derivative financial instruments, as reflected on the balance sheet, includes net unrealized losses on exchange traded futures and options contracts of \$16.9 million, which included \$16.5 million of net unrealized losses on derivative financial instruments designated as cash flow hedging instruments.

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

Effect of Derivative Instruments on Consolidated Statements of Income and Consolidated Statements of Stockholders' Equity and 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 or (Loss) Reclassified from Accumulated Other Comprehensive Income into Revenues	Amount of Gain or (Loss) Reclassified from Accumulated Other Comprehensive Income into Income		
	Year Ended December 31,		
	2018	2017	2016
Revenues	\$ (10,808)	\$ 18,167	\$ (8,094)
Cost of goods sold	1,252	(11,936)	(16,508)
Net increase (decrease) recognized in earnings before tax	\$ (9,556)	\$ 6,231	\$ (24,602)

Loss Recognized in Other Comprehensive Income on Derivatives Commodity Contracts	Amount of Loss Recognized in Other Comprehensive Income on Derivatives		
	Year Ended December 31,		
	2018	2017	2016
Commodity Contracts	\$ (9,642)	\$ (8,015)	\$ (29,238)

Derivatives Not Designated as Hedging Instruments	Location of Gain or (Loss) Recognized in Income on Derivatives	Amount of Gain Recognized in Income on Derivatives		
		Year Ended December 31,		
		2018	2017	2016
Commodity Contracts	Revenues	\$ 10,115	\$ (12,583)	\$ 6,071
Commodity Contracts	Costs of goods sold	18,944	27,078	11
		\$ 29,059	\$ 14,495	\$ 6,082

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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
Inventories	\$ 89,188	\$ 2,430

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

	Location and Amount of Gain or (Loss) Recognized in Income on Cash Flow and Fair Value Hedging Relationships					
	2018		2017		2016	
	Revenue	Cost of Goods Sold	Revenue	Cost of Goods Sold	Revenue	Cost of Goods Sold
Gain or (loss) on cash flow hedging relationships:						
Commodity contracts:						
Amount of gain or loss reclassified from accumulated other comprehensive income into income	\$ (10,808)	\$ 1,252	\$ 18,167	\$ (11,936)	\$ (8,094)	\$ (16,508)
Gain or (loss) on fair value hedging relationships:						
Commodity contracts:						
Hedged item	-	13,681	1,451	(6,229)	1,388	21,430
Derivatives designated as hedging instruments	-	(12,304)	(1,734)	8,530	(1,388)	(16,219)
Total amounts of income and expense line items presented in the statement of	\$ (10,808)	\$ 2,629	\$ 17,884	\$ (9,635)	\$ (8,094)	\$ (11,297)

financial performance in which the
effects of cash flow or fair value hedges
are recorded

There were no gains or losses from discontinuing cash flow or fair value hedge treatment during the years ended
December 31, 2018, 2017 and 2016.

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The open commodity derivative positions as of December 31, 2018, are as follows (in thousands):

December 31, 2018

Derivative Instruments	Exchange Traded		Non-Exchange Traded		Unit of Measure	Commodity
	Net Long & (Short) (1)		Long (2)	(Short) (2)		
Futures	(23,025)				Bushels	Corn and Soybeans
Futures	750	(3)			Bushels	Corn
Futures	(14,500)	(4)			Bushels	Corn
Futures	(80,850)				Gallons	Ethanol
Futures	(2,275)				mmBTU	Natural Gas
Futures	(13,888)	(4)			mmBTU	Natural Gas
Futures	(39,600)				Pounds	Livestock
Futures	(402,840)	(3)			Pounds	Cattle
Options	116				Tons	Soybean Meal
Options	5,519				Bushels	Corn and Soybeans
Options	13,146				Gallons	Ethanol
Options	(2,015)				mmBTU	Natural Gas
Options	(18,628)				Pounds	Livestock
Options	19				Barrels	Crude Oil
Forwards			25,071	(2,299)	Bushels	Corn and Soybeans
Forwards			567	(256,596)	Gallons	Ethanol
Forwards			131	(207)	Tons	Distillers Grains
Forwards			14,160	(43,426)	Pounds	Corn Oil
Forwards			15,422	(8,696)	mmBTU	Natural Gas

- (1) Exchange traded futures and options are presented on a net long and (short) position basis. Options are presented on a delta-adjusted basis.
- (2) Non-exchange traded forwards are presented on a gross long and (short) position basis including both fixed-price and basis contracts.
- (3) Futures used for cash flow hedges.
- (4) Futures or non-exchange traded forwards used for fair value hedges.

Energy trading contracts that do not involve physical delivery are presented net in revenues on the consolidated statements of income. Included in revenues are net gains of \$23.1 million, \$35.4 million, and \$11.6 million for the years ended December 31, 2018, 2017, and 2016 respectively, on energy trading contracts.

12. DEBT

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

	December 31,	
	2018	2017
Corporate:		
\$500.0 million term loan	\$ -	\$ 498,750
3.25% convertible notes due 2018	-	61,442
3.25% convertible notes due 2019	53,457	-
4.125% convertible notes due 2022	142,708	136,739
Green Plains Partners:		
\$200.0 million revolving credit facility	134,000	126,900
Other	26,022	27,744
Total face value of long-term debt	356,187	851,575
Unamortized debt issuance costs	(3,190)	(16,256)
Less: current portion of long-term debt	(54,807)	(67,923)
Total long-term debt	\$ 298,190	\$ 767,396

Scheduled long-term debt repayments, including full accretion of the 3.25% convertible notes due 2019 and of the 4.125% convertible notes due 2022 at maturity but excluding the effects of any debt discounts and debt issuance costs, are as follows (in thousands):

Year Ending December 31,	Amount
2019	\$ 58,185
2020	1,218
2021	135,007
2022	171,006
2023	1,006
Thereafter	20,437
Total	\$ 386,859

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

	December 31,	
	2018	2017
Green Plains Cattle:		
\$500.0 million revolver	\$ 374,492	\$ 270,860
Green Plains Grain:		
\$125.0 million revolver	41,000	75,000
\$50.0 million inventory financing	-	-
Green Plains Trade:		
\$300.0 million revolver	108,485	180,320
Green Plains Commodity Management:		
\$20.0 million hedge line	14,266	-
Total short-term notes payable and other borrowings	\$ 538,243	\$ 526,180

Corporate Activities

On August 29, 2017, the company entered into a \$500.0 million term loan agreement, which matures on August 29, 2023, to refinance approximately \$405.0 million of total debt outstanding issued by Green Plains Processing and Fleischmann's Vinegar, pay associated fees and expenses and for general corporate purposes. In November 2018, we repaid the remaining outstanding balance of our \$500.0 million term loan using a portion of the proceeds from the

sales of the three ethanol plants and Fleischmann's Vinegar. We did not incur any early termination penalties to the lenders as a result of the repayment.

Prior to the repayment of the \$500.0 million term loan on November 27, 2018, the term loan was guaranteed by the company and substantially all of its subsidiaries, except for Green Plains Partners and certain other entities, and secured by substantially all of the assets of the company, including 17 ethanol production facilities, vinegar production facilities and a second priority lien on the assets secured under the revolving credit facilities at Green Plains Trade, Green Plains Cattle and Green Plains Grain. The credit agreement contained certain customary representations and warranties, affirmative covenants, negative covenants, financial covenants and events of default. The negative covenants included restrictions on the ability to incur additional indebtedness, acquire and sell assets, create liens, make investments, pay distributions and enter into transactions with affiliates. At the end of each fiscal quarter, the covenants of the credit agreement required the company to maintain a maximum term debt to total term capitalization of 55% and a minimum interest coverage ratio of 1.25 to 1.00, as defined in the credit agreement. Beginning in 2018, the credit facility also had a provision requiring the company to make special annual payments of 50% or 75% of its available free cash flow, subject to certain limitations. Voluntary term loan prepayments were subject to prepayment fees of 1.0% if prepaid before the eighteen-month anniversary of the credit agreement. Scheduled principal payments were \$1.25 million each quarter until maturity. The term loan bore interest at a floating rate of a base rate plus a margin of 4.50% or LIBOR plus a margin of 5.50%.

In September 2013, the company issued \$120.0 million of 3.25% convertible senior notes due 2018, or the 3.25% notes. The 3.25% notes are senior, unsecured obligations of the company, with interest payable on April 1 and October 1 of each year. Prior to close of the exchange agreements on October 1, 2018, the company could settle the 3.25% notes in cash, common stock or a combination of cash and common stock. Prior to April 1, 2018, the 3.25% notes were not convertible unless certain conditions were satisfied. The conversion rate was subject to adjustment upon the occurrence of certain events, including when the quarterly cash dividend exceeds \$0.04 per share. The conversion rate was recently adjusted as of

September 30, 2018, to 50.8753 shares of common stock per \$1,000 of principal, which is equal to a conversion price of approximately \$19.66 per share. For all conversions of notes which occur on or after April 1, 2018, the company has elected to convert for whole shares of common stock with any fractional share being settled with cash in lieu.

Prior to the close of the exchange agreements on October 1, 2018, the company could redeem all of the 3.25% notes at any time on or after October 1, 2016, if the company's common stock equaled or exceeded 140% of the applicable conversion price for a specified time period ending on the trading day immediately prior to the date the company delivers notice of the redemption. The redemption price would equal 100% of the principal plus any accrued and unpaid interest. Holders of the 3.25% notes had the option to require the company to repurchase the 3.25% notes in cash at a price equal to 100% of the principal plus accrued and unpaid interest when there was a fundamental change, such as change in control. If an event of default occurred, it could result in the 3.25% notes being declared due and payable.

During the second quarter of 2018, the company entered into a privately negotiated agreement with a certain holder, on behalf of a certain beneficial owner of the company's 3.25% notes. Under this agreement, 50 shares of the company's common stock were exchanged for approximately \$1 thousand in aggregate principal amount of the 3.25% notes. Common stock held as treasury shares were exchanged for the 3.25% notes. Following the closing of this agreement, \$63.7 million aggregate principal amount of the 3.25% notes remained outstanding.

During the three months ended September 30, 2018, the company entered into exchange agreements with certain beneficial owners of the company's outstanding 3.25% convertible senior notes due 2018 (the "Old Notes"), pursuant to which such investors exchanged (the "Exchange") \$56.8 million in aggregate principal amount of the Old Notes for \$56.8 million in aggregate principal amount of notes due 2019 (the "New Notes"). The company evaluated the Exchange in accordance with ASC 470-50 and concluded that the Exchange qualified as a debt modification as the cash flows and fair value of the embedded conversion option of the New Notes were not substantially different from the Old Notes. As a result, the New Notes were recorded at fair value at the time of the exchange, and the company recorded a non-cash adjustment to additional paid-in capital of \$3.5 million, net of a \$1.2 million tax impact, related to the difference in fair value of the embedded conversion option of the Old Notes and the New Notes. Following the closing of these agreements, \$6.9 million aggregate principal of the Old Notes remained outstanding. On October 1, 2018, the maturity date of the Old Notes, the remaining aggregate principal of \$6.9 million was paid.

The New Notes are the senior, unsecured obligations of the company and bear interest at a rate of 3.25% per annum, payable semi-annually in arrears on April 1 and October 1 of each year, beginning on October 1, 2018. Interest on the New Notes will accrue from, and including, April 1, 2018. The New Notes will mature on October 1, 2019, unless earlier converted. Holders of New Notes may convert their New Notes, at their option, in integral multiples of \$1,000 principal amount, at any time prior to the close of business on the scheduled trading day immediately preceding the maturity date of the New Notes. The conversion rate for the New Notes was initially 50.6481 shares of the company's

common stock per \$1,000 principal amount of New Notes, which corresponded to an initial conversion price of approximately \$19.74 per share of the company's common stock. The conversion rate will be subject to adjustment upon the occurrence of certain events. Upon conversion of the convertible notes, the company will settle its conversion obligation by delivering shares of its common stock at the applicable conversion rate, together with cash in lieu of any fractional share.

The company does not have the right to redeem the New Notes at its election before their maturity. The New Notes are subject to customary provisions providing for the acceleration of their principal and interest upon the occurrence of events that constitute an "event of default." Events of default include, among other events, certain payment defaults, defaults in settling conversions, certain defaults under the company's other indebtedness and certain insolvency-related events. Upon maturity, the company will settle the New Notes in cash.

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 are senior, unsecured obligations of the company, with interest payable on March 1 and September 1 of each year. The company may settle the 4.125% notes in cash, common stock or a combination of cash and common stock.

Prior to March 1, 2022, the 4.125% notes are not convertible unless certain conditions are satisfied. The conversion rate is subject to adjustment upon the occurrence of certain events, including when the quarterly cash dividend exceeds \$0.12 per share and upon redemption of the 4.125% notes. The initial conversion rate is 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 company may redeem all, but not less than all, of the 4.125% notes at any time on or after September 1, 2020, if the company's common stock equals or exceeds 140% of the applicable conversion price for a specified time period ending on the trading day immediately prior to the date the company delivers notice of the redemption. The redemption price will equal 100% of the principal plus any accrued and unpaid interest. Holders of the 4.125% notes have the option to require the company to repurchase the 4.125% notes in cash at a price equal to 100% of the principal plus accrued and unpaid interest when there is a fundamental change, such as change in control. If an event of default occurs, it could result in the 4.125% notes being declared due and payable.

Ethanol Production Segment

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

Agribusiness and Energy Services Segment

Green Plains Grain has a \$125.0 million senior secured asset-based revolving credit facility, to finance working capital up to the maximum commitment based on eligible collateral equal to the sum of percentages of eligible cash, receivables and inventories, less miscellaneous adjustments. The credit facility matures on July 26, 2019. Advances are subject to an interest rate equal to LIBOR plus 3.00% or the lenders' base rate plus 2.00%. The credit facility also includes an accordion feature that enables the facility to be increased by up to \$75.0 million with agent approval. The credit facility can also be increased by up to \$50.0 million for seasonal borrowings. Total commitments outstanding cannot exceed \$250.0 million. The total unused portion of the \$125.0 million revolving credit facility is also subject to a commitment fee ranging from 0.375% to 0.50% per annum depending on utilization.

Lenders receive a first priority lien on certain cash, inventory, accounts receivable and other assets owned by Green Plains Grain. The terms impose affirmative and negative covenants for Green Plains Grain, including maintaining minimum working capital of \$22.0 million and tangible net worth of \$27.0 million. Capital expenditures are limited to \$8.0 million per year under the credit facility, plus equity contributions from the company and unused amounts of up to \$8.0 million from the previous year. In addition, the credit facility requires the company to maintain a minimum fixed charge coverage ratio of 1.25 to 1.00 and a maximum annual leverage ratio of 6.00 to 1.00 at the end of each quarter. The fixed charge coverage ratio and long-term capitalization ratio apply only if the company has long-term indebtedness on the date of calculation. As of December 31, 2018, Green Plains Grain had no long-term indebtedness. The credit facility also contains restrictions on distributions related to capital stock, with exceptions for distributions up to 50% of net profit before tax, subject to certain conditions.

Green Plains Trade has a \$300.0 million senior secured asset-based revolving credit facility to finance working capital for marketing and distribution activities based on eligible collateral equal to the sum of percentages of eligible receivables and inventories, less miscellaneous adjustments. The credit facility matures on July 28, 2022 and consists of a \$285 million credit facility and a \$15 million first-in-last-out (FILO) credit facility, and includes an accordion feature that enables the credit facility to be increased by up to \$70.0 million with agent approval. Advances are subject to variable interest rates equal to daily LIBOR plus 2.25% on the credit facility and daily LIBOR plus 3.25% on the FILO credit facility. The total unused portion of the revolving credit facility is also subject to a commitment fee of 0.375% per annum.

The terms impose affirmative and negative covenants for Green Plains Trade, including maintaining a minimum fixed charge coverage ratio of 1.15 to 1.00. Capital expenditures are limited to \$1.5 million per year under the credit facility. The credit facility also restricts distributions related to capital stock, with an exception for distributions up to 50% of net income if, on a pro forma basis, (a) availability has been greater than \$10.0 million for the last 30 days and (b) the borrower would be in compliance with the fixed charge coverage ratio on the distribution date.

Green Plains Grain has entered into short-term inventory financing agreements with a financial institution. The company has accounted for the agreements as short-term notes, rather than sales, and has elected the fair value option to offset fluctuations in market prices of the inventory. The company had no short-term notes payable related to these inventory financing agreements as of December 31, 2018.

Green Plains Commodity Management has an uncommitted \$20.0 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 LIBOR plus 1.75%. At December 31, 2018, the company had \$14.3 million outstanding on this facility.

Food and Ingredients Segment

Green Plains Cattle has a senior secured asset-based revolving credit facility, which was amended on July 31, 2018, to increase the maximum commitment from \$425.0 million to \$500.0 million and can be increased by an additional \$100.0 million with agent approval. On October 5, 2018, the company amended its revolving credit facility to provide the Joint Administrator, at its sole discretion, irrevocable authorization to (1) release any term loan priority collateral; (2) release any guarantor related to any release of any term loan priority collateral and/or (3) release the guaranty upon termination of the term loan agreement and repayment of all obligations owed by the company under the term loan agreement. The credit facility, which matures on April 30, 2020, finances working capital for the cattle feeding operations up to the maximum commitment based on eligible collateral equal to the sum of percentages of eligible receivables, inventories and other current assets, less miscellaneous adjustments. Advances, as amended, are subject to variable interest rates equal to LIBOR plus 2.00% to 3.00%, or the base rate plus 1.00% to 2.00%, depending upon the preceding three months' excess borrowing availability. The amended credit facility also includes an accordion feature that enables the credit facility to be increased by up to \$75.0 million with agent approval. The unused portion of the credit facility is also subject to a commitment fee of 0.20% to 0.30% per annum, depending on the preceding three months' excess borrowing availability.

Lenders receive a first priority lien on certain cash, inventory, accounts receivable, property and equipment and other assets owned by Green Plains Cattle. The amended terms impose affirmative and negative covenants, including maintaining a minimum working capital of 15% of the commitment amount, minimum tangible net worth of 20% of the commitment amount, plus 50% of net profit from the previous year, and a maximum total debt to tangible net worth ratio of 3.50 to 1.00. Capital expenditures are limited to \$10.0 million per year under the credit facility, plus \$10.0 million per year if funded by a contribution from parent, plus any unused amounts from the previous year.

Partnership Segment

Green Plains Partners, through a wholly owned subsidiary, has a \$200.0 million revolving credit facility, which matures on July 1, 2020, to fund working capital, acquisitions, distributions, capital expenditures and other general partnership purposes. Advances under the credit facility are subject to a floating interest rate based on the preceding fiscal quarter's consolidated leverage ratio at a base rate plus 1.25% to 2.00% or LIBOR plus 2.25% to 3.00%. On February 20, 2018, the partnership accessed an additional \$40.0 million to increase the revolving credit facility from \$195.0 million to \$235.0 million. On November 15, 2018, the partnership decreased the revolving credit facility from \$235.0 million to \$200.0 million. The credit facility can be increased by an additional \$20.0 million without the consent of the lenders. The unused portion of the credit facility is also subject to a commitment fee of 0.35% to 0.50%, depending on the preceding fiscal quarter's consolidated leverage ratio. There were no other significant changes in other covenants.

The partnership's obligations under the credit facility are secured by a first priority lien on (i) the capital stock 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 agreements with Green Plains Trade, and (iii) all proceeds and products of the equity interests of the partnership's present and future subsidiaries and its personal property. The terms impose affirmative and negative covenants including restricting 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 credit facility also requires the partnership to maintain a maximum consolidated net leverage ratio of no more than 3.50x and a minimum consolidated interest coverage ratio of no less than 2.75x, each of which is calculated on a pro forma basis with respect to acquisitions and divestitures occurring during the applicable period. The consolidated leverage ratio is calculated by dividing total funded indebtedness minus the lesser of cash in excess of \$5.0 million or \$30.0 million by the sum of the four preceding fiscal quarters' consolidated EBITDA. The consolidated interest coverage ratio is calculated by dividing the sum of the four preceding fiscal quarters' consolidated EBITDA by the sum of the four preceding fiscal quarters' interest charges.

In June 2013, the company issued promissory notes payable of \$10.0 million, which is recorded in long-term debt, and a note receivable of \$8.1 million, which is recorded in other assets, to execute a New Markets Tax Credit transaction related to the Birmingham, Alabama terminal. Beginning in March 2020, the promissory notes and note receivable each require quarterly principal and interest payments of approximately \$0.2 million. The company retains the right to call \$8.1 million of the promissory notes in 2020. The promissory notes payable and note receivable will be fully amortized upon maturity in September 2031. Income tax credits were generated for the lender, which the company has guaranteed over their statutory life of seven years in the event the credits are recaptured or reduced. At the time of the transaction, the income tax credits were valued at \$5.0 million. The company has not established a liability in connection with the guarantee because it believes the likelihood of recapture or reduction is remote.

Covenant Compliance

The company was in compliance with its debt covenants as of December 31, 2018 and 2017.

Restricted Net Assets

At December 31, 2018, there were approximately \$243.4 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.

13. STOCK-BASED COMPENSATION

The company has an equity incentive plan that reserves 4,110,000 shares of common stock for issuance to its directors and employees. The plan provides for shares, including options to purchase shares of common stock, stock appreciation rights tied to the value of common stock, restricted stock, performance share awards, and restricted and deferred stock unit awards, to be granted to eligible employees, non-employee directors and consultants. The company measures stock-based compensation at fair value on the grant date, with no adjustments for estimated forfeitures. The company records noncash compensation expense related to equity awards in its consolidated financial statements over the requisite period on a straight-line basis. Substantially all of the existing stock-based compensation has been equity awards.

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

- Stock Options – Stock options may be granted that can be exercised immediately in installments or at a fixed future date. Certain options are exercisable regardless of employment status while others expire following termination. Options issued to date may be exercised immediately or at future vesting dates, and expire five to eight years after the grant date. Compensation expense for stock options that vest over time is recognized on a straight-line basis over the requisite service period.

- Restricted Stock Awards – Restricted stock awards may be granted to directors and employees that vest immediately or over a period of time as determined by the compensation committee. Stock awards granted to date vested immediately and over a period of time, and included sale restrictions. Compensation expense is recognized on the grant date if fully vested or over the requisite vesting period.
- Performance Share Awards – Performance share awards may be granted to directors and employees that cliff-vest after a period of time as determined by the compensation committee. Performance share awards granted to date cliff-vest after a period of time, and included sale restrictions. Compensation expense is recognized over the requisite vesting period.
- Deferred Stock Units – Deferred stock units may be granted to directors and employees that vest immediately or over a period of time as determined by the compensation committee. Deferred stock units granted to date vest over a period of time with underlying shares of common stock that are issuable after the vesting date. Compensation expense is recognized on the grant date if fully vested, or over the requisite vesting period.

Stock Options

The fair value of the stock options is estimated on the date of the grant using the Black-Scholes option pricing model, a pricing model acceptable under GAAP. The expected life of the options is the period of time the options are expected to be outstanding. The company did not grant any stock option awards during the years ended December 31, 2018, 2017, and 2016.

The activity related to the exercisable stock options for the year ended December 31, 2018, is as follows:

	Shares	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value (in thousands)
Outstanding at December 31, 2017	143,750	\$ 12.44	1.8	\$ 635
Granted	-	-	-	-
Exercised	(15,000)	10.00	-	120
Forfeited	-	-	-	-
Expired	-	-	-	-
Outstanding at December 31, 2018	128,750	\$ 12.72	1.0	\$ 89
Exercisable at December 31, 2018 (1)	128,750	\$ 12.72	1.0	\$ 89

(1) Includes in-the-money options totaling 118,750 shares at a weighted-average exercise price of \$12.36.

Option awards allow employees to exercise options through cash payment for the shares of common stock or simultaneous broker-assisted transactions in which the employee authorizes the exercise and immediate sale of the option in the open market. The company uses newly issued shares of common stock to satisfy its stock-based payment obligations.

Restricted Stock Awards and Deferred Stock Units

The non-vested restricted stock award and deferred stock unit activity for the year ended December 31, 2018, are as follows:

Non-Vested Shares and	Weighted-Average	Weighted-Average Remaining
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	Deferred Stock Units	Grant- Date Fair Value	Vesting Term (in years)
Nonvested at December 31, 2017	1,068,947	\$ 20.41	
Granted	519,876	18.24	
Forfeited	(109,996)	19.59	
Vested	(596,539)	20.57	
Nonvested at December 31, 2018	882,288	\$ 19.12	1.7

Performance Share Awards

On March 19, 2018, the board of directors granted 153,030 performance shares to be awarded in the form of common stock to certain participants of the plan. Performance shares vest based on the company's average return on net assets (RONA) and the company's total shareholder return (TSR), as further described herein. The performance shares vest on March 19, 2021, if the RONA and TSR criteria are achieved and the participant is then employed by the company. Fifty percent of the performance shares vest based upon the company's ability to achieve a predetermined RONA during the three year performance period. The remaining fifty percent of the performance shares vest based upon the company's total TSR during the three year performance period relative to that of the company's performance peer group.

The performance shares were granted at a target of 100%, but each performance share will increase or decrease depending on results for the performance period for the company's RONA, and the company's TSR relative to that of the performance peer group. If the company's RONA and TSR achieve the maximum goals, the maximum amount of shares available to be issued pursuant to this award is 201,033 performance shares or 150% of the 134,022 performance shares outstanding as of December 31, 2018. The actual number of performance shares that will ultimately vest is based on the actual percentile ranking of the company's RONA, and the company's TSR compared to the peer performance at the end of the performance period.

The company used the Monte Carlo valuation model to estimate the fair value of the performance shares on the date of the grant. The weighted average assumptions used by the company in applying the Monte Carlo valuation model for performance share grants during the twelve months ended December 31, 2018, are illustrated in the following table:

	2018
Risk-free interest rate	2.44 %
Dividend yield	2.64 %
Expected volatility	45.11 %

The Monte Carlo valuation also estimated the number of performance shares that would be awarded which is reflected in the fair value on the grant date. The Monte Carlo valuation assumed 97.39% of the performance shares granted on March 19, 2018, would be awarded on March 19, 2021, based upon the estimated company's total shareholder return relative to peer performance. The company's closing stock price was \$18.15 on the date of the grant.

The non-vested performance share award activity for the year ended December 31, 2018, are as follows:

	Performance Shares
Nonvested at December 31, 2017	-
Granted	153,030
Forfeited	(19,008)
Nonvested at December 31, 2018	134,022

At December 31, 2018, unrecognized stock compensation expense of \$1.8 million, excluding any potential forfeitures, will be recognized over the vesting period of these performance share awards on a straight-line basis.

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

The non-vested unit-based awards activity for the year ended December 31, 2018, are as follows:

	Non-Vested Shares and Deferred Stock Units	Weighted- Average Grant-Date Fair Value	Weighted-Average Remaining Vesting Term (in years)
Nonvested at December 31, 2017	11,549	\$ 19.06	
Granted	18,582	16.96	
Forfeited	-	-	
Vested	(11,549)	19.06	
Nonvested at December 31, 2018	18,582	\$ 16.96	0.5

Stock-Based and Unit-Based Compensation Expense

Compensation costs for stock-based and unit-based payment plans during the years ended December 31, 2018, 2017 and 2016, were approximately \$11.4 million, \$12.2 million and \$9.5 million, respectively. The decrease in stock compensation for the year ended December 31, 2018 was largely due to current year forfeitures, offset by additional expense recorded due to the accelerated vesting of stock awards during the year. At December 31, 2018, there were \$9.9 million of unrecognized compensation costs from stock-based and unit-based compensation related to non-vested awards. This compensation is expected to be recognized over a weighted-average period of approximately 1.6 years. The potential tax benefit related to stock-based payment is approximately 25.2% of these expenses.

14. EARNINGS PER SHARE

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

During 2016, diluted EPS was computed using the treasury stock method for the convertible debt instruments, by dividing net income by the weighted average number of common shares outstanding during the period, adjusted for the dilutive effect of the convertible debt instruments and any other outstanding dilutive securities. Beginning in the first quarter of 2017, the company changed its method for calculating dilutive EPS related to its convertible debt instruments from the treasury stock method to the if-converted method, as the company changed its financial strategy with respect to cash settlement of these instruments. As such, the company computed diluted EPS for 2017 and 2018 by dividing net income on an if-converted basis, adjusted to add back net interest expense related to the convertible debt instruments, by the weighted average number of common shares outstanding during the period, adjusted to include the shares that would be issued if the convertible debt instruments were converted to common shares and the effect of any outstanding dilutive securities.

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

	Year Ended December 31,		
	2018	2017	2016
Basic EPS:			
Net income attributable to Green Plains	\$ 15,923	\$ 61,061	\$ 10,663
Weighted average shares outstanding - basic	40,320	39,247	38,318
EPS - basic	\$ 0.39	\$ 1.56	\$ 0.28
Diluted EPS:			
Net income attributable to Green Plains	\$ 15,923	\$ 61,061	\$ 10,663
Interest and amortization on convertible debt, net of tax effect:			
3.25% notes	-	4,433	-
4.125% notes	-	8,159	-
Net income attributable to Green Plains - diluted	\$ 15,923	\$ 73,653	\$ 10,663
Weighted average shares outstanding - basic	40,320	39,247	38,318

Effect of dilutive convertible debt:			
3.25% notes	-	4,209	155
4.125% notes	-	6,071	-
Effect of dilutive stock-based compensation awards	934	713	100
Weighted average shares outstanding - diluted	41,254	50,240	38,573
EPS - diluted	\$ 0.39	\$ 1.47	\$ 0.28

Excluded from the calculation of diluted EPS for the twelve months ended December 31, 2018 were 7.3 million shares related to the effect of the convertible debt, as the inclusion of these shares would have been dilutive.

15. STOCKHOLDERS' EQUITY

Treasury Stock

The company holds 5.5 million shares of its common stock at a cost of \$58.2 million. Treasury stock is recorded at cost and reduces stockholders' equity in the consolidated balance sheets. When shares are reissued, the company will use the weighted average cost method for determining the cost basis. The difference between the cost and the issuance price is added or deducted from additional paid-in capital.

Share Repurchase Program

In August 2014, the company announced a share repurchase program of up to \$100 million of its common stock. Under the program, the company may repurchase shares in open market transactions, privately negotiated transactions, accelerated share buyback programs, tender offers or by other means. The timing and amount of repurchase transactions are determined by its management based on market conditions, share price, legal requirements and other factors. The program may be

suspended, modified or discontinued at any time without prior notice. The company repurchased 209,682 shares of common stock for approximately \$3.0 million during 2018. Since inception, the company has repurchased 1,119,349 shares of common stock for approximately \$19.7 million under the program.

Dividends

The company has paid a quarterly cash dividend since August 2013 and anticipates declaring a cash dividend in future quarters on a regular basis. Future declarations of dividends, however, are subject to board approval and may be adjusted as the company's liquidity, business needs or market conditions change. On February 6, 2019, the company's board of directors declared a quarterly cash dividend of \$0.12 per share. The dividend is payable on March 15, 2019, to shareholders of record at the close of business on February 22, 2019.

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 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 of the partnership plus all or any portion of the cash on hand resulting from working capital borrowings made subsequent to the end of that quarter. On January 17, 2019, the board of directors of the general partner of the partnership declared a cash distribution of \$0.475 per unit on outstanding common units. The distribution is payable on February 8, 2019, to unitholders of record at the close of business on February 1, 2019.

Accumulated Other Comprehensive Income

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

	Year Ended December 31,			Statements of Income
	2018	2017	2016	Classification
Gains (losses) on cash flow hedges:				
Commodity derivatives	\$ (10,808)	\$ 18,167	\$ (8,094)	Revenues

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Commodity derivatives	1,252	(11,936)	(16,508)	Cost of goods sold
Total	(9,556)	6,231	(24,602)	Income (loss) before income taxes
Income tax expense (benefit)	(2,887)	2,306	(8,830)	Income tax expense (benefit)
Amounts reclassified from accumulated other comprehensive income (loss)	\$ (6,669)	\$ 3,925	\$ (15,772)	

At December 31, 2018 and 2017, the company's consolidated balance sheets reflected unrealized losses of \$16.0 million and \$13.1 million, net of tax, in accumulated other comprehensive loss, respectively.

Hereford and Hopewell Drop-Down

Effective January 1, 2016, the partnership acquired the storage and transportation assets of the Hereford and Hopewell production facilities in a transfer between entities under common control for approximately \$62.3 million.

16. RESTRUCTURING ACTIVITIES

In the second quarter of 2018, the company announced its portfolio optimization program of which one of the five strategic objectives was to reduce controllable expenses. As part of the program, the company implemented a workforce reduction at certain of its facilities, including its corporate location. The associated severance costs were recognized at the time both the employee and employer were irrevocably committed to the terms of the separation. As of December 31, 2018, the company recognized a \$4.2 million charge for such workforce reductions it had implemented through that date with \$3.8 million classified as selling, general and administrative expense and \$0.4 million classified as costs of goods sold. Of the \$4.2 million charge, \$3.1 million was recorded in the corporate segment, \$0.7 million was recorded in the agribusiness and energy services segment, \$0.4 million was recorded in the ethanol production segment. Approximately \$2.7 million of the total charge was included in accrued liabilities as of December 31, 2018.

17. INCOME TAXES

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the carrying amounts of existing assets and liabilities and their respective tax bases, and net operating loss and tax credit carry-forwards. Deferred tax assets and liabilities are measured using enacted rates expected to be applicable to taxable income in the years those temporary differences are recovered or settled. The effect on deferred tax assets and liabilities from a change in tax rates is recognized in income during the period that includes the enactment date. The Tax Cuts and Jobs Act was enacted on December 22, 2017 and was effective January 1, 2018. Due to the significance of the legislation, the SEC issued Staff Accounting Bulletin 118 (SAB 118), which provides for a measurement period to complete the accounting for certain elements of the tax reform. We have completed the analysis of the legislation and its impact to the financial statements. The company has determined that the deductibility of certain officer compensation is now limited under the new legislation. The tax impact of \$0.7 million for the amount that is not expected to be realized has been recorded to tax expense. This adjustment had an immaterial impact to the effective tax rate.

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

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

	Year Ended December 31,		
	2018	2017	2016
Current	\$ 7,758	\$ (43,705)	\$ 2,950
Deferred	(24,484)	(81,077)	4,910
Total	\$ (16,726)	\$ (124,782)	\$ 7,860

The reduced benefit in 2018 compared to 2017 is primarily due to the company's recognition of tax benefits related to enactment of the Tax Cuts and Jobs Act and for the completion of a multi-year study for Research and Development credits, or R&D Credits in 2017.

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During the years ended December 31, 2018 and 2017, the company recognized a net income tax benefit of \$19.6 million and \$48.1 million, respectively, for federal and state R&D Credits. In addition, \$2.3 million and \$9.2 million, net, in refundable credits not dependent upon taxable income was recorded as a reduction of cost of goods sold during the years ended December 31, 2018 and 2017, respectively. R&D Credits recorded during 2017 related to tax years 2013 to 2016 as well as an estimated year-to-date tax benefit for federal and state R&D Credits for the 2017 tax year.

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

	Year Ended December 31,		
	2018	2017	2016
Tax expense at federal statutory rate	\$ 4,202	\$ (15,103)	\$ 13,423
State income tax expense, net of federal benefit	981	(915)	323
Nondeductible compensation	921	222	185
Noncontrolling interests	(4,370)	(7,199)	(6,940)
Unrecognized tax benefits	15,148	25,720	-
R&D credits	(34,979)	(74,033)	-
Disposition of subsidiary	(1,022)	-	-
Tax Cuts and Jobs Act impact	278	(54,485)	-
Stock compensation	993	-	-
Audit adjustments	559	-	-
Amended return adjustments	374	-	-
Other	189	1,011	869
Income tax expense (benefit)	\$ (16,726)	\$ (124,782)	\$ 7,860

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

	December 31,	
	2018	2017
Deferred tax assets:		
Net operating loss carryforwards - Federal	\$ -	\$ 12,767
Net operating loss carryforwards - State	4,004	5,291
Tax credit carryforwards - Federal	47,956	30,783
Tax credit carryforwards - State	9,369	5,342
Derivative financial instruments	-	2,592
Deferred revenue	2,236	919
Interest expense carryforward	2,048	-
Investment in partnerships	50,009	55,956
Inventory valuation	3,603	1,944
Stock-based compensation	1,458	2,468
Accrued expenses	5,439	5,541
Capital leases	2,516	2,426
Other	43	47
Total deferred tax assets	128,681	126,076
Deferred tax liabilities:		
Convertible debt	(7,508)	(8,350)
Fixed assets	(118,330)	(149,746)
Derivative financial instruments	(1,573)	-
Organizational and start-up costs	(3,980)	(20,947)
Total deferred tax liabilities	(131,391)	(179,043)
Valuation allowance	(7,413)	(3,834)
Deferred income taxes	\$ (10,123)	\$ (56,801)

At December 31, 2018, the company has federal R&D credits of \$48.0 million which will begin to expire in 2033. The company also has \$9.4 million of state credits which will expire beginning in 2021.

The company has state net operating losses of \$4.0 million which will begin to expire in 2022.

The company maintains a valuation allowance for its net deferred tax assets due to uncertainty that it will realize these assets in the future. The deferred tax valuation allowance of \$7.4 million as of December 31, 2018, relates to state tax

credits that are not expected to be realized prior to expiration starting in 2021. The deferred tax valuation allowance as of December 31, 2017 was \$3.8 million. The increase in the deferred tax valuation allowance was primarily due to state R&D credits generated that are not expected to be realized prior to expiration. Management considers whether it is more likely than not that some or all of the deferred tax assets will be realized, which is dependent on the generation of future taxable income and other tax attributes during the periods those temporary differences become deductible. Scheduled reversals of deferred tax liabilities, projected future taxable income, and tax planning strategies are considered to make this assessment.

The company's federal and state returns for the tax years ended December 31, 2014, and later are still subject to audit. A reconciliation of unrecognized tax benefits is as follows (in thousands):

Unrecognized Tax Benefits	
Balance at January 1, 2018	\$ 25,976
Additions for prior year tax positions	5,980
Additions for current year tax positions	20,922
Settlements of prior year tax positions	(1,149)
Reductions for prior year tax positions	(171)
Balance at December 31, 2018	\$ 51,558

Recognition of these tax benefits would favorably impact the company's effective tax rate. Unrecognized tax benefits of \$51.6 million include \$40.8 million recorded as a reduction of the deferred asset associated with the federal tax credit carryforwards. Interest and penalties associated with uncertain tax positions are accrued as part of income taxes payable.

18. COMMITMENTS AND CONTINGENCIES

Operating Leases

The company leases certain facilities, equipment and parcels of land under agreements that expire at various dates. For accounting purposes, rent expense is based on a straight-line amortization of the total payments required over the lease. The company incurred lease expenses of \$38.8 million, \$45.8 million and \$38.0 million during the years ended December 31, 2018, 2017 and 2016, respectively.

Aggregate minimum lease payments under these agreements for future fiscal years are as follows (in thousands):

Year Ending December 31,	Amount
2019	\$ 23,552
2020	17,473
2021	9,812
2022	7,325
2023	3,594
Thereafter	28,542
Total	\$ 90,298

Commodities

As of December 31, 2018, the company had contracted future purchases of grain, corn oil, natural gas, ethanol, distillers grains and cattle, valued at approximately \$289.3 million.

Legal

In November 2013, the company acquired two ethanol plants located in Fairmont, Minnesota and Wood River, Nebraska. There was ongoing litigation related to the consideration for this acquisition. On August 19, 2016, the Delaware Superior Court granted Green Plains' motion for summary judgment in part and held that the seller's attempt to disclaim liability for certain shortfall amounts through the use of a disclaimer provision was ineffective. On October 30, 2018, the ongoing litigation was settled and an adjustment to reduce the cost of inventory purchased in the acquisition was recorded in the fourth quarter as a reduction of costs of goods sold.

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

19. EMPLOYEE BENEFIT PLANS

The company offers eligible employees a comprehensive employee benefits plan that includes health, dental, vision, life and accidental death, short-term disability and long-term disability insurance, and flexible spending accounts. The company also offers a 401(k) plan enabling eligible employees to save for retirement on a tax-deferred basis up to the limits allowed under the Internal Revenue Code and matches up to 4% of eligible employee contributions. Employee and employer contributions are 100% vested immediately. Employer contributions to the 401(k) plan for the years ended December 31, 2018, 2017 and 2016 were \$2.2 million, \$2.1 million and \$1.6 million, respectively.

The company contributes to a defined benefit pension plan. Since January of 2009, the benefits under the plan were frozen; however, the company remains obligated to ensure the plan is funded according to its requirements. As of December 31, 2018, the plan's assets were \$4.9 million and liabilities were \$6.5 million. At December 31, 2018 and 2017, net liabilities of \$1.6 million and \$0.6 million were included in other liabilities on the consolidated balance sheets, respectively.

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20. RELATED PARTY TRANSACTIONS

Commercial Contracts

In March 2014, a subsidiary of the company entered into \$1.4 million of new equipment financing agreements with Amur Equipment Finance, whom Gordon Glade, a member of the company's board of directors, was formerly a shareholder. Amur Equipment Finance is no longer considered a related party as of the third quarter of 2018. There was \$0.6 million related to these financing arrangements included in debt at December 31, 2017. Payments, including principal and interest, totaled \$0.2 million for the year ended December 31, 2018 and \$0.3 million for the years ended December 31, 2017 and 2016.

Aircraft Leases

Effective January 1, 2015, the company entered into two agreements with an entity controlled by Wayne Hoovestol for the lease of two aircrafts. Mr. Hoovestol is chairman of the company's board of directors. The company agreed to pay \$9,766 per month for the combined use of up to 125 hours per year of the aircrafts. Flight time in excess of 125 hours per year will incur additional hourly charges. During the years ended December 31, 2018, 2017 and 2016, payments related to these leases totaled \$159 thousand, \$182 thousand and \$190 thousand, respectively. The company had no outstanding payables related to these agreements at December 31, 2018, and \$2 thousand in outstanding payables related to these agreements at December 31, 2017.

21. QUARTERLY FINANCIAL DATA (Unaudited)

The following table includes unaudited financial data for each of the quarters within the years ended December 31, 2018 and 2017 (in thousands, except per share amounts), which is derived from the company's consolidated financial statements. In management's opinion, the financial data reflects all of the adjustments necessary for a fair presentation of the quarters presented. The operating results for any quarter are not necessarily indicative of results for any future period.

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	Three Months Ended			
	December 31,	September 30,	June 30,	March 31,
	2018	2018	2018	2018
Revenues	\$ 811,129	\$ 1,000,100	\$ 986,837	\$ 1,045,287
Costs and expenses (1)	703,888	999,451	975,072	1,049,212
Operating income (loss)	107,241	649	11,765	(3,925)
Other expense	(32,672)	(22,726)	(18,767)	(21,557)
Income tax benefit (expense)	(14,712)	14,658	10,753	6,027
Net income (loss) attributable to Green Plains	53,503	(12,469)	(994)	(24,117)
Basic earnings (loss) per share attributable to Green Plains	1.32	(0.31)	(0.02)	(0.60)
Diluted earnings (loss) per share attributable to Green Plains	1.13	(0.31)	(0.02)	(0.60)

	Three Months Ended			
	December 31,	September 30,	June 30,	March 31,
	2017	2017	2017	2017
Revenues	\$ 920,984	\$ 901,235	\$ 886,263	\$ 887,684
Costs and expenses	913,560	880,519	890,049	870,292
Operating income (loss)	7,424	20,716	(3,786)	17,392
Other expense	(18,954)	(30,062)	(17,759)	(18,122)
Income tax benefit (2)	63,877	48,775	9,749	2,381
Net income (loss) attributable to Green Plains	46,630	34,394	(16,366)	(3,597)
Basic earnings (loss) per share attributable to Green Plains	1.16	0.83	(0.41)	(0.09)
Diluted earnings (loss) per share attributable to Green Plains	0.99	0.74	(0.41)	(0.09)

- (1) The fourth quarter of 2018 includes the net gain on the sale of assets of \$150.4 million related to the sale of three ethanol plants and Fleischmann's Vinegar.
- (2) The third and fourth quarters of 2017 reflect adjustments for R&D Credits and the reduced tax rate due to the Tax Cuts and Jobs Act.