CF Industries Holdings, Inc.
Form 10-K
February 22, 2019
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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549
FORM 10-K
(Mark One)

ý	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

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

Commission file number 001-32597
CF INDUSTRIES HOLDINGS, INC.
(Exact name of registrant as specified in its charter)

Delaware	20-2697511
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
4 Parkway North, Suite 400, Deerfield, Illinois	60015
(Address of principal executive offices)	(Zip Code)

Registrant’s telephone number, including area code (847) 405-2400
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
common stock, par value $0.01 per share	New York Stock Exchange

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 ý No o
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 o No ý
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 ý No o
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 ý No o
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) 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. o
Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer” “smaller reporting company,” and “emerging growth company” in Rule 12b-2 of the Exchange Act.

Large accelerated filer	Accelerated filer	Non-accelerated filer	Smaller reporting	Emerging growth
ý	o	o	company o	company o

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. o

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

The aggregate market value of the registrant’s common stock held by non-affiliates as of June 29, 2018 (the last business day of the registrant’s most recently completed second fiscal quarter), computed by reference to the closing sale price of the registrant’s common stock, was $10,318,413,880.

222,890,557 shares of the registrant’s common stock, par value $0.01 per share, were outstanding as of January 31, 2019.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant’s definitive proxy statement for its 2019 annual meeting of stockholders (Proxy Statement) are incorporated by reference into Part III of this Annual Report on Form 10-K. The Proxy Statement will be filed with the Securities and Exchange Commission, pursuant to Regulation 14A, not later than 120 days after the end of the 2018 fiscal year, or, if the registrant does not file the Proxy Statement within such 120-day period, the registrant will amend this Annual Report on Form 10-K to include the information required under Part III hereof not later than the end of such 120-day period.

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PART I

ITEM 1. BUSINESS.

Our Company

All references to "CF Holdings," "we," "us," "our" and "the Company," refer to CF Industries Holdings, Inc. and its subsidiaries, except where the context makes clear that the reference is only to CF Industries Holdings, Inc. itself and not its subsidiaries. All references to "CF Industries" refer to CF Industries, Inc., a 100% owned subsidiary of CF Industries Holdings, Inc. Notes referenced throughout this document refer to consolidated financial statement note disclosures that are found in Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements.

We are a leading global fertilizer and chemical company. Our 3,000 employees operate world-class manufacturing complexes in Canada, the United Kingdom and the United States. Our principal nitrogen fertilizer products are ammonia, granular urea, urea ammonium nitrate solution (UAN) and ammonium nitrate (AN). Our other nitrogen products include diesel exhaust fluid (DEF), urea liquor, nitric acid and aqua ammonia, which are sold primarily to our industrial customers, and compound fertilizer products (NPKs), which are solid granular fertilizer products for which the nutrient content is a combination of nitrogen, phosphorus, and potassium. We serve our customers in North America through our production, storage, transportation and distribution network. We also reach a global customer base with exports from our Donaldsonville, Louisiana, plant, the world's largest and most flexible nitrogen complex. Additionally, we move product to international destinations from our Verdigris, Oklahoma, facility, our Yazoo City, Mississippi, facility, and our Billingham and Ince facilities in the United Kingdom, and a joint venture ammonia facility in the Republic of Trinidad and Tobago in which we own a 50 percent interest.

Our principal assets include:

- five U.S. nitrogen fertilizer manufacturing facilities, located in Donaldsonville, Louisiana (the largest nitrogen fertilizer complex in the world); Port Neal, Iowa; Yazoo City, Mississippi; Verdigris, Oklahoma; and Woodward, Oklahoma. These facilities are owned directly or indirectly by CF Industries Nitrogen, LLC (CFN), of which we own approximately 89% and CHS Inc. (CHS) owns the remainder. See Note 17—Noncontrolling Interests for additional information on our strategic venture with CHS;
- two Canadian nitrogen fertilizer manufacturing facilities, located in Medicine Hat, Alberta (the largest nitrogen fertilizer complex in Canada) and Courtright, Ontario;
- two United Kingdom nitrogen manufacturing facilities, located in Billingham and Ince;
- an extensive system of terminals and associated transportation equipment located primarily in the Midwestern United States; and
- a 50% interest in Point Lisas Nitrogen Limited (PLNL), an ammonia production joint venture located in the Republic of Trinidad and Tobago that we account for under the equity method.

Our nitrogen fertilizer manufacturing facility in Verdigris, Oklahoma, is owned and operated by Terra Nitrogen, Limited Partnership (TNLP). Prior to April 2, 2018, TNLP was a subsidiary of Terra Nitrogen Company, L.P. (TNCLP), which was a publicly traded limited partnership of which we were the sole general partner and the majority limited partner, and in which we owned an approximate 75.3% interest.

In 2018, we announced that in accordance with the terms of TNCLP's First Amended and Restated Agreement of Limited Partnership (as amended by Amendment No. 1 to the First Amended and Restated Agreement of Limited Partnership, the TNCLP Agreement of Limited Partnership), Terra Nitrogen GP Inc. (TNGP), the sole general partner of TNCLP and an indirect wholly owned subsidiary of CF Holdings, elected to exercise its right to purchase all of the 4,612,562 publicly traded common units of TNCLP (the TNCLP Public Units). TNGP completed its purchase of the TNCLP Public Units on April 2, 2018 (the Purchase), for an aggregate cash purchase price of $388 million. We funded the Purchase with cash on hand. Upon completion of the Purchase, CF Holdings owned, through its subsidiaries, 100 percent of the general and limited partnership interests of TNCLP.

In 2016, we completed our capacity expansion projects at Donaldsonville, Louisiana and Port Neal, Iowa. These projects, originally announced in 2012, included the construction of new ammonia, urea, and UAN plants at our Donaldsonville, Louisiana complex and new ammonia and urea plants at our Port Neal, Iowa complex. These plants increased our overall production capacity by approximately 25%, improved our product mix flexibility at Donaldsonville, and improved our ability to serve upper-Midwest urea customers from our Port Neal location. These new facilities allow us to benefit from the cost advantages of North American natural gas. At our Donaldsonville complex, the ammonia plant was placed in service in the fourth quarter of 2016, the UAN plant was placed in service in the first quarter of 2016 and the granular urea plant was placed in service in the fourth quarter of 2015. At our Port Neal, Iowa complex, both the ammonia and granular urea plants were placed in service in the fourth quarter of 2016. The total capital cost of the capacity expansion projects was $5.2 billion.

We commenced a strategic venture with CHS on February 1, 2016, at which time CHS made a capital contribution of $2.8 billion to CFN in exchange for membership interests in CFN, which represented approximately 11% of the total membership interests of CFN. We own the remaining membership interests. On February 1, 2016, CHS also began receiving deliveries pursuant to a supply agreement under which CHS has the right to purchase annually from CFN up to approximately 1.1 million tons of granular urea and 580,000 tons of UAN at market prices. As a result of its minority equity interest in CFN, CHS is entitled to semi-annual cash distributions from CFN. We are also entitled to semi-annual cash distributions from CFN. See Note 17—Noncontrolling Interests for additional information on our strategic venture with CHS.

On July 31, 2015, we acquired the remaining 50% equity interest in CF Fertilisers UK Group Limited (formerly known as GrowHow UK Group Limited) (CF Fertilisers UK) not previously owned by us for total consideration of $570 million, and CF Fertilisers UK became wholly owned by us. This transaction added CF Fertilisers UK's nitrogen manufacturing complexes in Ince, United Kingdom and Billingham, United Kingdom to our consolidated manufacturing capacity.

For the years ended December 31, 2018, 2017 and 2016, we sold 19.3 million, 20.0 million and 17.0 million product tons generating net sales of $4.43 billion, $4.13 billion and $3.69 billion, respectively.

Our principal executive offices are located outside of Chicago, Illinois, at 4 Parkway North, Suite 400, Deerfield, Illinois 60015, and our telephone number is 847-405-2400. Our Internet website address is www.cfindustries.com. Information made available on our website does not constitute part of this Annual Report on Form 10-K.

We make available free of charge on or through our Internet website, www.cfindustries.com, all of our reports on Forms 10-K, 10-Q and 8-K and all amendments to those reports as soon as reasonably practicable after such material is filed electronically with, or furnished to, the Securities and Exchange Commission (SEC). Copies of our Corporate Governance Guidelines, Code of Corporate Conduct and charters for the Audit Committee, Compensation and Management Development Committee, and Corporate Governance and Nominating Committee of our Board of Directors (the Board) are also available on our Internet website. We will provide electronic or paper copies of these documents free of charge upon request. The SEC also maintains a website at www.sec.gov that contains reports, proxy and information statements and other information regarding issuers that file electronically with the SEC.

Company History

We were founded in 1946 as a fertilizer brokerage operation by a group of regional agricultural cooperatives. During the 1960s, we expanded our distribution capabilities and diversified into fertilizer manufacturing through the acquisition of several existing plants and facilities. During the 1970s and again during the 1990s, we expanded our production and distribution capabilities significantly, spending approximately $1 billion in each of these decades.

We operated as a traditional manufacturing and supply cooperative until 2002, when we adopted a new business model that established financial performance as our principal objective, rather than assured supply to our owners. A critical aspect of the new business model was to establish a more economically driven approach to the marketplace.

In August 2005, we completed our initial public offering (IPO) of common stock, which is listed on the New York Stock Exchange. In connection with the IPO, we consummated a reorganization transaction whereby we ceased to be a cooperative and our pre-IPO owners' equity interests in CF Industries were canceled in exchange for all of the proceeds of the offering and shares of our common stock.

In April 2010, we acquired Terra Industries Inc. (Terra), a leading North American producer and marketer of nitrogen fertilizer products for a purchase price of $4.6 billion, which was paid in cash and shares of our common stock. As a result of the Terra acquisition, we acquired five nitrogen fertilizer manufacturing facilities, an approximately 75.3% interest in TNCLP and certain joint venture interests.

In March 2014, we completed the sale of our phosphate mining and manufacturing business, which was located in Florida, to Mosaic Inc. for approximately $1.4 billion in cash.

In July 2015, we acquired the remaining 50% equity interest in CF Fertilisers UK not previously owned by us for total consideration of $570 million, and CF Fertilisers UK became wholly owned by us.

In February 2016, our strategic venture with CHS commenced, at which time CHS made a capital contribution of $2.8 billion to CFN in exchange for membership interests in CFN, which represented approximately 11% of the total membership interests of CFN.

In 2016, we completed capacity expansion projects at Donaldsonville, Louisiana and Port Neal, Iowa which increased our production capacity by approximately 25% for a total capital cost of $5.2 billion.

In 2018, we announced that TNGP elected to exercise its right to purchase the TNCLP Public Units. TNGP completed the Purchase on April 2, 2018, for an aggregate cash purchase price of $388 million. Upon completion of the Purchase, CF Holdings owned, through its subsidiaries, 100 percent of the general and limited partnership interests of TNCLP.

Product Tons and Nutrient Tons

Unless otherwise stated, we measure our production and sales volume in this Annual Report on Form 10-K in product tons, which represents the weight of the product measured in short tons (one short ton is equal to 2,000 pounds). References to UAN product tons assume a 32% nitrogen content basis for production volume.

We also provide certain supplementary volume information measured in nutrient tons. Nutrient tons represent the weight of the product's nitrogen content, which varies by product. Ammonia represents 82% nitrogen content, granular urea represents 46% nitrogen content, UAN represents between 28% and 32% nitrogen content and AN represents between 29% and 35% nitrogen content.

Reportable Segments

Our reportable segments consist of the following segments: ammonia, granular urea, UAN, AN and Other. These segments are differentiated by products. We use gross margin to evaluate segment performance and allocate resources. Total other operating costs and expenses (consisting of selling, general and administrative expenses and other operating—net) and non-operating expenses (interest and income taxes), are centrally managed and are not included in the measurement of segment profitability reviewed by management. See Note 21—Segment Disclosures for additional information.

Our Products

Our primary nitrogen fertilizer products are ammonia, granular urea, UAN and AN. Our historical sales of nitrogen fertilizer products are shown in the following table. Net sales do not reflect amounts used internally, such as ammonia, in the manufacture of other products.

	2018		2017		2016	
	Sales Volume (tons)	Net Sales	Sales Volume (tons)	Net Sales	Sales Volume (tons)	Net Sales
	(tons in thousands; dollars in millions)					
Products						
Ammonia	3,135	$1,028	4,105	$1,209	2,874	$981
Granular urea	4,898	1,322	4,357	971	3,597	831
UAN	7,042	1,234	7,093	1,134	6,681	1,196
AN	2,002	460	2,353	497	2,151	411
Other[1]	2,252	385	2,044	319	1,654	266
Total	19,329	$4,429	19,952	$4,130	16,957	$3,685

(1) Other segment products include DEF, urea liquor, nitric acid, aqua ammonia and NPKs.

Gross margin was $917 million, $434 million and $843 million for the years ended December 31, 2018, 2017 and 2016, respectively.

We own and operate seven nitrogen fertilizer manufacturing facilities in North America, including five nitrogen fertilizer manufacturing facilities in the United States, one in Medicine Hat, Alberta, Canada and one in Courtright, Ontario, Canada. As of December 31, 2018, the combined production capacity of these seven facilities represented approximately 41%, 42%, 44% and 19% of North American ammonia, granular urea, UAN and AN production capacity, respectively. Each of our nitrogen fertilizer manufacturing facilities in North America has on-site storage to provide flexibility to manage the flow of outbound shipments without impacting production. We also operate two United Kingdom nitrogen manufacturing facilities located in Billingham and Ince that produce ammonia, AN and NPKs and serve primarily the British agricultural and industrial markets.

The following table shows the production capacities as of December 31, 2018 at each of our nitrogen manufacturing facilities:

	Average Annual Capacity[1]					
	Gross Ammonia[2]	Net Ammonia[2]	UAN[3]	Urea[4]	AN[5]	Other[6]
	(tons in thousands)					
Donaldsonville, Louisiana[7]	4,335	1,390	3,255	2,635	—	445
Medicine Hat, Alberta	1,230	770	—	810	—	—
Port Neal, Iowa	1,230	110	800	1,350	—	110
Verdigris, Oklahoma[8]	1,210	430	1,955	—	—	—
Woodward, Oklahoma	480	130	810	—	—	115
Yazoo City, Mississippi[8][9]	570	—	160	—	1,035	125
Courtright, Ontario[8][10]	500	265	345	—	—	400
Ince, U.K.[11]	380	15	—	—	575	415
Billingham, U.K.[8]	595	230	—	—	625	410
	10,530	3,340	7,325	4,795	2,235	2,020
Unconsolidated Affiliate						
Point Lisas, Trinidad[12]	360	360	—	—	—	—
Total	10,890	3,700	7,325	4,795	2,235	2,020

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(1) Average annual capacity includes allowance for normal outages and planned maintenance shutdowns.

(2) Gross ammonia capacity includes ammonia used to produce upgraded products. Net ammonia capacity is gross ammonia capacity less ammonia used to produce upgraded products based on the product mix shown in the table.

(3) Measured in tons of UAN containing 32% nitrogen by weight.

(4) Reflects granular urea capacity from the Donaldsonville, Medicine Hat, and Port Neal facilities. Urea liquor and DEF production capacities are included in Other.

(5) AN includes prilled products (Amtrate and industrial-grade AN, or IGAN) and AN solution produced for sale.

(6) Includes product tons of: urea liquor and DEF from the Donaldsonville, Port Neal, Woodward, Yazoo City, and Courtright facilities; nitric acid from the Courtright, Yazoo City, Billingham, and Ince facilities; and NPKs from the Ince facility. Production of DEF can be increased by reducing urea and/or UAN production.

(7) The Donaldsonville facility capacities present an estimated production mix. This facility is capable of producing between 2.4 million and 3.3 million tons of granular urea and between 1.2 million and 4.3 million tons of UAN annually. The facility is also capable of producing up to 1.2 million product tons of 32.5% DEF.

(8) Reduction of UAN or AN production at the Yazoo City, Courtright, Verdigris and Billingham facilities can allow more merchant nitric acid to be made available for sale.

(9) The Yazoo City facility's production capacity depends on product mix. With the facility maximizing the production of AN products, 160,000 tons of UAN can be produced. UAN production can be increased to 450,000 tons by reducing the production of AN to 900,000 tons.

(10) Production of urea liquor and DEF at the Courtright facility can be increased by reducing UAN production.

(11) The Ince facility can increase production of NPKs and nitric acid by reducing AN production.

(12) Represents our 50% interest in the capacity of PLNL.

The following table summarizes our nitrogen fertilizer production volume for the last three years:

December 31,		
2018	2017	2016

	(tons in thousands)		
Ammonia[1]	9,805	10,295	8,307
Granular urea	4,837	4,451	3,368
UAN (32%)	6,903	6,914	6,698
AN	1,731	2,127	1,845

[1] Gross ammonia production, including amounts subsequently upgraded on-site into granular urea, UAN or AN.

Donaldsonville, Louisiana

The Donaldsonville nitrogen fertilizer complex is the world's largest nitrogen fertilizer production facility. It has six ammonia plants, five urea plants, four nitric acid plants, three UAN plants, and one DEF plant. The complex, which is located on the Mississippi River, includes deep-water docking facilities, access to an ammonia pipeline, and truck and railroad loading capabilities. The complex has on-site storage for 140,000 tons of ammonia, 201,000 tons of UAN (measured on a 32% nitrogen content basis) and 130,000 tons of granular urea.

As part of our capacity expansion projects, a new Donaldsonville urea plant became operational during the fourth quarter of 2015. A new UAN plant was placed in service in the first quarter of 2016, and a new ammonia plant was placed in service in the fourth quarter of 2016.

Medicine Hat, Alberta, Canada

Medicine Hat is the largest nitrogen fertilizer complex in Canada. It has two ammonia plants and one urea plant. The complex has on-site storage for 60,000 tons of ammonia and 60,000 tons of granular urea.

Port Neal, Iowa

The Port Neal facility is located approximately 12 miles south of Sioux City, Iowa on the Missouri River. The facility consists of two ammonia plants, three urea plants, two nitric acid plants and a UAN plant. The location has on-site storage for 85,000 tons of ammonia, 130,000 tons of granular urea, and 70,000 tons of 32% UAN.

As part of our capacity expansion projects, a new ammonia plant and a new urea plant were placed in service in the fourth quarter of 2016.

Verdigris, Oklahoma

The Verdigris facility is located northeast of Tulsa, Oklahoma, near the Verdigris River. It is the second largest UAN production facility in North America. The facility comprises two ammonia plants, two nitric acid plants, two UAN plants and a port terminal. We operate the plants and lease the port terminal from the Tulsa-Rogers County Port Authority. The complex has on-site storage for 60,000 tons of ammonia and 100,000 tons of 32% UAN.

Woodward, Oklahoma

The Woodward facility is located in rural northwest Oklahoma and consists of an ammonia plant, two nitric acid plants, two urea plants and two UAN plants. The facility has on-site storage for 36,000 tons of ammonia and 84,000 tons of 32% UAN.

Yazoo City, Mississippi

The Yazoo City facility is located in central Mississippi and includes one ammonia plant, four nitric acid plants, an AN plant, two urea plants, a UAN plant and a dinitrogen tetroxide production and storage facility. The site has on-site storage for 50,000 tons of ammonia, 48,000 tons of 32% UAN and 11,000 tons of AN and related products.

Courtright, Ontario, Canada

The Courtright facility is located south of Sarnia, Ontario near the St. Clair River. The facility consists of an ammonia plant, a UAN plant, a nitric acid plant and a urea plant. The location has on-site storage for 64,000 tons of ammonia, 10,400 tons of granular urea and 16,000 tons of 32% UAN.

Ince, United Kingdom

The Ince facility is located in northwestern England and consists of an ammonia plant, three nitric acid plants, an AN plant and three NPK plants. The location has on-site storage for 11,000 tons of ammonia, 95,000 tons of AN, and 40,000 tons of NPKs.

Billingham, United Kingdom

The Billingham facility, located in the Teesside chemical area in northeastern England, is geographically split among three primary locations: the main site, which contains an ammonia plant, three nitric acid plants and a carbon dioxide plant; the Portrack site, approximately two miles away, which contains an AN fertilizer plant; and the North Tees site, approximately seven miles away, which contains an ammonia storage area. These locations collectively have on-site storage for 40,000 tons of ammonia and 128,000 tons of AN.

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Point Lisas, Trinidad

The Point Lisas Nitrogen facility in the Republic of Trinidad and Tobago is owned jointly through a 50/50 venture with Koch Fertilizer LLC. This facility has the capacity to produce 720,000 tons of ammonia annually from natural gas supplied under a contract with The National Gas Company of Trinidad and Tobago Limited (NGC).

Nitrogen Fertilizer Raw Materials

Natural gas is the principal raw material and primary fuel source used in the ammonia production process at our nitrogen fertilizer manufacturing facilities. In 2018, natural gas accounted for approximately 40% of our total production costs for nitrogen fertilizer products. Our nitrogen fertilizer manufacturing facilities have access to abundant, competitively-priced natural gas through a reliable network of pipelines that are connected to major natural gas trading hubs near the facilities. Our facilities utilize the following natural gas hubs: Henry Hub in Louisiana; SONAT in Louisiana; TETCO ELA in Louisiana; ONEOK in Oklahoma; AECO in Alberta; Ventura in Iowa; Demarcation in Kansas; Welcome in Minnesota; Dawn in Ontario; Parkway in Ontario; and the National Balancing Point (NBP) in the United Kingdom.

In 2018, our nitrogen manufacturing facilities consumed, in the aggregate, approximately 347 million MMBtus of natural gas. We employ a combination of daily spot and term purchases from a variety of quality suppliers to maintain a reliable, competitively-priced supply of natural gas. We also use certain financial instruments to hedge natural gas prices. See Note 15—Derivative Financial Instruments for additional information about our natural gas hedging activities.

Nitrogen Fertilizer Distribution

The safe, efficient and economical distribution of nitrogen fertilizer products is critical for successful operations. Our nitrogen fertilizer production facilities have access to multiple transportation modes by which we ship fertilizer products to terminals, warehouses and customers. Each of our production facilities has a unique distribution pattern based on its production capacity and location.

Our North American nitrogen production facilities can ship products via truck and rail to customers and to our storage facilities in the U.S. and Canada, with access to our leased railcar fleet of approximately 5,000 tank and hopper cars, as well as railcars provided by rail carriers. Our United Kingdom nitrogen production facilities mainly ship products via truck.

The North American waterway system is also used extensively to ship products from our Donaldsonville, Verdigris and Yazoo City facilities. To ship ammonia and UAN, we employ a fleet of eleven tow boats and thirty-two river barges, which are primarily leased. We also utilize contract marine services to move urea fertilizer. We can also export nitrogen fertilizer products via seagoing vessels from our Donaldsonville, Yazoo City, Billingham and Ince manufacturing facilities.

Three of our nitrogen production facilities also have access to pipelines for the transportation of ammonia. The Donaldsonville facility is connected to the 2,000-mile long Nustar pipeline through which we have the ability to transport ammonia to ten terminals and shipping points in the midwestern U.S. corn belt. Our Verdigris and Port Neal facilities are connected to the 1,100-mile long Magellan ammonia pipeline that also serves the Midwestern United States. On January 31, 2019, Magellan Midstream Partners, L.P. announced its decision to discontinue commercial operations of the ammonia pipeline beginning in late 2019.

Storage Facilities and Other Properties

As of December 31, 2018, we owned or leased space at 61 in-market storage terminals and warehouses located in a 22-state region of the United States, Canada and the United Kingdom. Including storage at our production facilities, we have an aggregate storage capacity for approximately 3.3 million tons of product. Our storage capabilities are summarized in the following table:

	Ammonia		Granular Urea		UAN[1]		AN	
	Number of Facilities	Capacity (000 Tons)	Number of Facilities	Capacity (000 Tons)	Number of Facilities	Capacity (000 Tons)	Number of Facilities	Capacity (000 Tons)
Plants	9	546	4	330	6	519	3	234
Terminal and Warehouse Locations								
Owned	22	780	1	200	8	214	—	—
Leased[2]	5	178	1	7	24	320	—	—
Total In-Market	27	958	2	207	32	534	—	—
Total Storage Capacity		1,504		537		1,053		234

(1) Capacity is expressed as the equivalent volume of UAN measured on a 32% nitrogen content basis.
(2) Our lease agreements are typically for periods of one to five years.

Customers

The principal customers for our nitrogen fertilizer and other nitrogen products are cooperatives, independent fertilizer distributors, traders, wholesalers, farmers and industrial users. CHS was our largest customer in 2018 and accounted for approximately 14% of our consolidated net sales. Sales are generated by our internal marketing and sales force.

Competition

Our markets are global and intensely competitive, based primarily on delivered price and, to a lesser extent, on customer service and product quality. During the peak demand periods, product availability and delivery time also play a role in the buying decisions of customers.

Our primary North American-based competitors include Nutrien Ltd. (formed in January 2018 by the merger of Agrium Inc. and Potash Corporation of Saskatchewan Inc.), Koch Fertilizer LLC and Iowa Fertilizer Company. In addition, Yara BASF started up a new North American nitrogen fertilizer production facility in April 2018. There is also significant competition from products sourced from other regions of the world, including some with lower natural gas or other feedstock costs. Because ammonia, urea and UAN are widely-traded fertilizer products and there are limited barriers to entry, we experience competition from foreign-sourced products continuously.

Our primary United Kingdom competition comes from imported products supplied by companies including Yara International, Origin Fertilisers, Ameropa, CHS and Helm. Urea and UAN are not produced in the United Kingdom, but along with AN are widely-traded fertilizer products with limited barriers to entry.

Seasonality

The fertilizer business is seasonal. The degree of seasonality of our business can change significantly from year to year due to weather conditions in the agricultural industry and other factors. The strongest demand for our products in North America occurs during the spring planting season, with a second period of strong demand following the fall harvest. In contrast, we and other fertilizer producers generally manufacture and distribute products throughout the year. As a result, we and/or our customers generally build inventories during the low demand periods of the year to ensure timely product availability during the peak sales seasons. Seasonality is greatest for ammonia due to the short application season and the limited ability of our customers and their customers to store significant quantities of this product. The seasonality of fertilizer demand generally results in our sales volumes and net sales being the highest during the spring and our working capital requirements being the highest just prior to the start of the spring planting season. Our quarterly financial results can vary significantly from one year to the next due to weather-related shifts in planting schedules and purchasing patterns.

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Environmental, Health and Safety

We are subject to numerous environmental, health and safety laws and regulations in the United States, Canada, the United Kingdom, the European Union and the Republic of Trinidad and Tobago, including laws and regulations relating to the generation and handling of hazardous substances and wastes; the cleanup of hazardous substance releases; the discharge of regulated substances to air or water; and the demolition of existing plant sites upon permanent closure. In the United States, these laws include the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Toxic Substances Control Act (TSCA) and various other federal, state, provincial, local and international statutes. Violations of environmental, health and safety laws can result in substantial penalties, court orders to install pollution-control equipment, civil and criminal sanctions, permit revocations and facility shutdowns. In addition, environmental, health and safety laws and regulations may impose joint and several liability, without regard to fault, for cleanup costs on potentially responsible parties who have released or disposed of hazardous substances into the environment. We may be subject to more stringent enforcement of existing or new environmental, health and safety laws in the future.

Environmental, Health and Safety Expenditures

Our environmental, health and safety capital expenditures in 2018 totaled approximately $40 million. We estimate that we will have approximately $60 million of capital expenditures for environmental, health and safety in 2019. Environmental, health and safety laws and regulations are complex, change frequently and have tended to become more stringent over time. We expect that continued government and public emphasis on environmental issues will result in increased future expenditures for environmental controls at our operations. Such expenditures could have a material adverse effect on our business, financial condition, results of operations and cash flows. Additionally, future environmental, health and safety laws and regulations or reinterpretation of current laws and regulations may require us to make substantial expenditures. Our costs to comply with, or any liabilities under, these laws and regulations could have a material adverse effect on our business, financial condition, results of operations and cash flows.

CERCLA/Remediation Matters

From time to time, we receive notices from governmental agencies or third parties alleging that we are a potentially responsible party at certain cleanup sites under CERCLA or other environmental cleanup laws. In 2011, we received a notice from the Idaho Department of Environmental Quality (IDEQ) that alleged that we were a potentially responsible party for the cleanup of a former phosphate mine we owned in the late 1950s and early 1960s located in Georgetown Canyon, Idaho. The current owner of the property and a former mining contractor received similar notices for the site. We and the current owner are currently conducting a remedial investigation/feasibility study of the site. In 2015, we and several other parties received a notice that the U.S. Department of Interior and other trustees intend to undertake a natural resource damage assessment for a group of former phosphate mines in southeast Idaho, including the former Georgetown Canyon mine. See Note 20—Contingencies for additional information on the CERCLA/Remediation matters.

Regulation of Greenhouse Gases

We are subject to regulations in the United Kingdom, the European Union, Canada and the United States concerning greenhouse gas (GHG) emissions.

The United Kingdom is a party to the Kyoto Protocol. As a result of agreements reached during a conference in Durban, South Africa in 2011, the Kyoto Protocol will continue in force for a second commitment period, which will expire by 2020. On December 12, 2015, 195 countries adopted by consensus a new international agreement known as the Paris Agreement. The Paris Agreement is intended to provide a framework pursuant to which the parties to the agreement will attempt to hold the increase in global average temperatures to below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. The Paris Agreement, which has been accepted by the United States and ratified by Canada and the United Kingdom, went into effect in

November 2016. The Paris Agreement could result in more aggressive efforts to reduce GHG emissions in the jurisdictions in which we operate.

The United Kingdom has adopted GHG emissions regulations, including regulations to implement the European Union Greenhouse Gas Emission Trading System (EU ETS). Our U.K. manufacturing plants are required to report GHG emissions annually to the United Kingdom Environment Agency pursuant to their site Environmental Permits and Climate Change Agreement, which specify energy efficiency targets. Failure to meet efficiency targets may require these plants to purchase CO_2 emissions allowances. The steam boilers at each of our U.K. sites are also subject to the EU ETS. However, the continued applicability of the EU ETS in the United Kingdom is uncertain due to the potential exit of the United Kingdom from the European Union (Brexit).

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Canada withdrew from further participation in the Kyoto Protocol in December 2011, but is a party to the Paris Agreement. In Canada, we are required to conduct an annual review of our operations with respect to compliance with Environment Canada's National Pollutant Release Inventory and Ontario's Mandatory Monitoring and Reporting Regulation and the GHG Reporting Regulation. In 2018, the federal Greenhouse Pollution Pricing Act came into effect, pursuant to which the Canadian Department of the Environment will implement the Output-Based Performance Standard (OBPS), which is intended to function as a backstop to provincial greenhouse gas emissions regulations. The Department of the Environment is currently proposing that the benchmark for nitrogen fertilizer plants be set at 90% of the average performance of Canadian fertilizer plants. In the provinces and territories where the OBPS will apply, a facility whose carbon emissions exceed this benchmark will be required to offset emissions by obtaining and retiring surplus emission credits, obtaining qualifying emissions offsets, or paying a fee of $20 per ton of excess carbon dioxide equivalent (CO_2e) for calendar year 2019, which fee will rise by $10 per ton for each year through 2022.

In January 2017, Ontario launched its own GHG cap and trade program and beginning January 1, 2018, Ontario's cap and trade program was linked with the cap and trade programs in Quebec and California. Our Courtright Nitrogen Complex was subject to the Ontario cap and trade program. However, the government elected in Ontario in June 2018 rescinded the cap and trade program. Because Ontario no longer has a GHG regulatory regime, the federal government will impose the OBPS in the province. The federal government intends to finalize the OBPS in the first half of 2019 and then retroactively apply it to January 2019 in impacted provinces. Ontario and Saskatchewan are challenging whether the federal government has jurisdiction to impose a federal carbon price on the provinces and territories.

In Alberta, the Specified Gas Emitters Regulation was implemented in 2007. This program required facilities emitting more than 100,000 tons of GHGs per year to reduce emissions by 12% over such facilities' 2007 levels. To meet this requirement, companies could reduce emissions, purchase/use offset credits, or contribute to a technology fund at an annual rate of $15 per ton of CO_2. Beginning in 2018, our Medicine Hat Nitrogen Complex became subject to the Carbon Competitiveness Incentive Regulation (CCIR). This regulation establishes product-specific benchmarks based on the most efficient GHG emitting facilities in a sector. A facility with emissions that exceed the applicable benchmark will be required to take action to reduce its GHG emissions intensity, purchase emissions offsets or performance credits, or make contributions to Alberta's climate fund. The federal government has determined that Alberta's CCIR meets its stringency requirements so that the federal OBPS will not apply in Alberta in 2019. However, the government of Alberta has not determined whether it will agree to increase the effective price of carbon beyond the current price of $30 per ton of excess CO_2e. This could result in regulated facilities in Alberta being subject to the OBPS beginning in 2021, when the effective price of carbon pursuant to the Greenhouse Pollution Pricing Act rises to $40 per ton of excess CO_2e.

The United States is not a party to the Kyoto Protocol, but is a party to the Paris Agreement. However, in June 2017, the United States announced its intention to withdraw from the Paris Agreement, subject to renegotiation of the Paris Agreement on terms more favorable to the United States. Under the terms of the Paris Agreement, the United States cannot formally provide notice of its withdrawal before November 2019, which would become effective one year after providing such notice. In the interim, it is unclear if the United States will comply with its commitments under the Paris Agreement. There has been no indication to date that the United States' announced withdrawal is causing other countries to also consider withdrawing from the Paris Agreement. In the United States, GHG regulation is evolving at state, regional and federal levels, although some of the more significant developments to date, including EPA's Clean Power Plan (which the current Administration has proposed to rescind), do not directly impose obligations on our facilities. The EPA has issued a mandatory GHG reporting rule that required all of our U.S. manufacturing facilities to commence monitoring GHG emissions beginning on January 1, 2010 and reporting the previous year's emissions annually starting in 2011. In addition, if we seek to modify or expand any of our major facilities and as a result, are required to obtain a Prevention of Significant Deterioration (PSD) construction permit applicable to such facilities, we could be subject to pollution control requirements applicable to GHGs in addition to requirements applicable to conventional air pollutants. Such requirements may result in increased costs or delays in completing such projects. Other than the states' implementation of this permitting requirement, none of the states where our U.S. production facilities are located-Iowa, Louisiana, Mississippi and Oklahoma-has proposed control regulations limiting GHG emissions.

New Source Performance Standards for Nitric Acid Plants

We operate 14 nitric acid plants in the United States. On August 14, 2012, the EPA issued a final regulation revising air emission standards applicable to newly constructed, reconstructed or modified nitric acid plants. The regulations will apply to these plants if and when we undertake activities or operations that are considered modifications, including physical changes that would allow us to increase our production capacity at these plants. The regulations include certain provisions that could make it difficult for us to meet the limits on emissions of nitrogen oxides (NOx) notwithstanding pollution controls we may add to our plants, and accordingly, the regulations could impact our ability to expand production at our existing plants. The EPA regulation did not include a limitation on emissions of nitrous oxide (a greenhouse gas).

Regulatory Permits and Approvals

We hold numerous environmental and other governmental permits and approvals authorizing operations at each of our facilities. A decision by a government agency to deny or delay issuing a new or renewed regulatory material permit or approval, or to revoke or substantially modify an existing material permit or approval, could have a material adverse effect on our ability to continue operations at the affected facility. Any future expansion of our existing operations is also predicated upon securing the necessary environmental or other permits or approvals. More stringent environmental standards may impact our ability to obtain such permits.

Employees

As of December 31, 2018, we employed approximately 2,900 full-time and 100 part-time employees.

ITEM 1A. RISK FACTORS.

In addition to the other information contained in this Annual Report on Form 10-K, you should carefully consider the factors discussed below before deciding to invest in any of our securities. These risks and uncertainties could materially and adversely affect our business, financial condition, results of operations and cash flows.

Our business is cyclical, resulting in periods of industry oversupply during which our financial condition, results of operations and cash flows tend to be negatively affected.

Historically, selling prices for our products have fluctuated in response to periodic changes in supply and demand conditions. Demand for nitrogen is affected by planted acreage, crop selection and fertilizer application rates, driven by population growth or changes in dietary habits and non-food use of crops, such as production of ethanol and other biofuels among other things. Demand also includes industrial uses of nitrogen, for example chemicals manufacturing and emissions reductants such as diesel exhaust fluid (DEF). Supply is affected by available capacity and operating rates, raw material costs and availability, government policies and global trade.

Periods of strong demand, high capacity utilization and increasing operating margins tend to stimulate global investment in production capacity. Fertilizer producers, including CF Holdings, have built new production facilities or expanded capacity of existing production assets, or announced plans to do so. The construction of new nitrogen fertilizer manufacturing capacity in the industry, plus improvements to increase output from the existing production assets, increase nitrogen supply availability and affect the balance of supply and demand. In recent years, global nitrogen fertilizer capacity has increased faster than global nitrogen fertilizer demand, creating a surplus of global nitrogen fertilizer capacity leading to lower nitrogen fertilizer selling prices. For example, in the two-year period ended December 31, 2017, additional production capacity came on line and, at the same time, the average selling price for our products declined 34%, from $314 per ton in 2015 to $207 per ton in 2017.

Additional production capacity is expected to come on line over the next 12 months, primarily outside of North America. We cannot predict the impact of this additional capacity. Also, global or local economic and financial conditions or changes in such conditions, or other factors may cause acceleration of other announced and/or ongoing projects.

Price fluctuations for our products result from changes in supply and demand. Significant price fluctuations we experience could be symptoms of an oversupplied market in transition as new capacity ramps up, and production slows down or shuts down in high cost regions. Additionally, trade flows adjust as imports into different regions of the world also impact the local supply and demand balances. If imports increase into an oversupplied region, lower prices in that region could result.

During periods of industry oversupply, our financial condition, results of operations and cash flows tend to be affected negatively as the price at which we sell our products typically declines, resulting in possible reduced profit margins, write-downs in the value of our inventory and temporary or permanent curtailments of production. In recent years, our financial performance, credit ratings and the trading price for our common stock were negatively impacted by the lower selling prices resulting from the global oversupply of nitrogen fertilizer. While the average selling price for our products has increased 11% in 2018 to $229 per ton compared to $207 per ton in 2017, the period of time that these oversupply conditions will persist and the degree to which they will impact our business, financial condition, results of operations and cash flows is uncertain.

Our products are global commodities, and we face intense global competition from other fertilizer producers.

We are subject to intense price competition from our competitors. Most fertilizers are global commodities, with little or no product differentiation, and customers make their purchasing decisions principally on the basis of delivered price and to a lesser extent on customer service and product quality. As a consequence, conditions in the international market for nitrogen products significantly influence our operating results.

We compete with many producers, including state-owned and government-subsidized entities. Consolidation in the industry may increase the resources of several of our competitors. For example, in January 2018, our competitors

Agrium Inc. and Potash Corporation of Saskatchewan Inc. completed their merger into the newly formed company Nutrien Ltd. Some of our competitors have greater total resources and are less dependent on earnings from fertilizer sales, which make them less vulnerable to industry downturns and better positioned to pursue new expansion and development opportunities. Furthermore, certain governments as owners of some of our competitors may be willing to accept lower prices and profitability on their products in order to support domestic employment or other political or social goals. Our competitive position could suffer to the extent we are not able to expand our own resources, either through investments in new or existing operations or through acquisitions, joint ventures or partnerships.

China, the world's largest producer and consumer of nitrogen fertilizers, currently has significant capacity surplus and many high-cost plants. As a result, the domestic nitrogen industry in China is operating at less than full capacity. If Chinese government policy, devaluation of the Chinese renminbi or decreases in Chinese producers' underlying costs such as the price of Chinese coal encourage increased production capacity utilization, any resulting export volume could adversely affect the balance between global supply and demand and may put downward pressure on global fertilizer prices, which could materially adversely affect our business, financial condition, results of operations and cash flows.

Our competitors in Russia continue to benefit from non-market pricing of natural gas, allowing continued exports from the region, and have significant nitrogen fertilizer export capacity. The 2016 revocations of U.S. antidumping measures on solid urea and fertilizer grade ammonium nitrate from Russia has allowed for increases in imports from that country in recent years.

We also face competition from other fertilizer producers in the Middle East, Europe, Latin America and Africa, who, depending on market conditions, fluctuating input prices, geographic location and freight economics, may take actions at times with respect to price or selling volumes that adversely affect our business, financial condition, results of operations and cash flows.

In addition, the international market for nitrogen products is influenced by such factors as currency exchange rates, including the relative value of the U.S. dollar and its impact upon the cost of importing of nitrogen products into the United States, foreign agricultural policies, the existence of, or changes in, import or foreign currency exchange barriers in certain foreign markets and the laws and policies of the markets in which we operate, including the imposition of new duties, tariffs or quotas, that affect foreign trade and investment. For example, the European Union is currently conducting an antidumping inquiry of UAN producers in the United States, Trinidad and Tobago and Russia. The result of this inquiry, and its impact, if any, on the international market for nitrogen products, is uncertain. In addition, it is uncertain as to whether additional inquiries or other actions in the international market for nitrogen fertilizer, if any, would have an adverse impact on the international market for our products.

A decline in agricultural production or limitations on the use of our products for agricultural purposes could materially adversely affect the demand for our products.

Conditions in the United States, Europe and other global agricultural areas significantly impact our operating results. Agricultural planted areas and production can be affected by a number of factors, including weather patterns and field conditions, current and projected grain inventories and prices, demand for agricultural products and governmental policies regarding production of or trade in agricultural products. These factors are outside of our control.

Governmental policies, including farm and biofuel subsidies, commodity support programs and tariffs, as well as the prices of fertilizer products, may also directly or indirectly influence the number of acres planted, the mix of crops planted and the use of fertilizers for particular agricultural applications. Ethanol production in the United States contributes significantly to corn demand, due in part to federal legislation mandating use of renewable fuels. An increase in ethanol production has led to an increase in the amount of corn grown in the United States and to increased fertilizer usage on both corn and other crops that have also benefited from improved farm economics. While the current Renewable Fuel Standard (RFS) encourages continued high levels of corn-based ethanol production, a continuing "food versus fuel" debate and other factors have resulted in calls to eliminate or reduce the renewable fuel mandate, or to eliminate or reduce corn-based ethanol as part of the renewable fuel mandate. This could have an adverse effect on corn-based ethanol production, planted corn acreage and fertilizer demand.

Developments in crop technology, such as nitrogen fixation, the conversion of atmospheric nitrogen into compounds that plants can assimilate, or nitrogen-efficient varieties, or developments in alternatives to traditional animal feed or alternative proteins, could also reduce the use of chemical fertilizers and adversely affect the demand for our products. Widespread adoption of emerging application technologies or alternative farming techniques could disrupt traditional application practices, affecting the volume or types of products used and timing of applications. In addition, from time to time various state legislatures have considered limitations on the use and application of chemical fertilizers due to concerns about the impact of these products on the environment. Any reduction in the demand for chemical fertilizer products, including as a result of technological developments and/or limitations on the use and application of chemical fertilizers, could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our business is dependent on natural gas, the prices of which are subject to volatility.

Natural gas is the principal raw material used to produce nitrogen fertilizers. We use natural gas both as a chemical feedstock and as a fuel to produce ammonia, granular urea, urea ammonium nitrate solution (UAN), ammonium nitrate (AN) and other nitrogen products.

Because most of our nitrogen fertilizer manufacturing facilities are located in the United States and Canada, North American natural gas comprises a significant portion of the total production cost of our products. The price of natural gas in North America has been volatile in recent years. During 2018, the daily closing price at the Henry Hub, the most heavily-traded natural gas pricing point in North America, reached a low of $2.48 per MMBtu on four consecutive days in February 2018 and a high of $6.88 per MMBtu on January 4, 2018. During the three-year period ended December 31, 2018, the daily closing price at the Henry Hub reached a low of $1.49 per MMBtu on three consecutive days in March 2016 and a high of $6.88 per MMBtu on January 4, 2018.

We also have manufacturing facilities located in the United Kingdom. These facilities are subject to fluctuations associated with the price of natural gas in Europe, which has also been volatile in recent years. The major natural gas trading point for the United Kingdom is the National Balancing Point (NBP). During 2018, the daily closing price at NBP reached a low of $6.60 per MMBtu on two consecutive days in January 2018 and a high of $31.74 per MMBtu on March 2, 2018. During the three-year period ended December 31, 2018, the daily closing price at NBP reached a low of $2.80 per MMBtu on September 1, September 12 and September 14, 2016 and a high of $31.74 per MMBtu on March 2, 2018.

Changes in the supply of and demand for natural gas can lead to extended periods of higher natural gas prices. If high prices were to persist, especially during a period of low fertilizer selling prices, it could have a material adverse effect on our business, financial condition, results of operations and cash flows.

The price of natural gas in North America and worldwide has been volatile in recent years and has declined on average due in part to the development of significant natural gas reserves, including shale gas, and the rapid improvement in shale gas extraction techniques, such as hydraulic fracturing and horizontal drilling. Future production of natural gas from shale formations could be reduced by regulatory changes that restrict drilling or hydraulic fracturing or increase its cost or by reduction in oil exploration and development prompted by lower oil prices and resulting in production of less associated gas.

Certain of our plants are located near natural gas hubs that have experienced increased natural gas development and have favorable basis differences as compared to other North American hubs. Favorable basis differences in certain regions may dissipate over time due to increases in natural gas pipeline or storage capacity in those regions. Additionally, basis differentials may become materially unfavorable due to a lack of inbound gas pipeline or storage capacity in other regions during periods of unusually high demand. Increased demand for natural gas, particularly in the Gulf Coast Region, due to increased industrial demand and increased natural gas exports could result in increased natural gas prices. If such reduced production, increased demand or changes in basis were to occur, or if other developments adversely impact the supply/demand balance for natural gas in the United States or elsewhere, natural gas prices could rise, which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our operations and those of our joint venture are dependent upon raw materials provided by third parties, and any delay or interruption in the delivery of raw materials may adversely affect our business.

We and our joint venture use natural gas and other raw materials in the manufacture of nitrogen products. We purchase the natural gas and other raw materials from third party suppliers. Our natural gas is transported by pipeline to our facilities and those of our joint venture by third party transportation providers or through the use of facilities owned by third parties. Delays or interruptions in the delivery of natural gas or other raw materials may be caused by, among other things, severe weather or natural disasters, unscheduled downtime, labor difficulties, insolvency of our suppliers or their inability to meet existing contractual arrangements, deliberate sabotage and terrorist incidents, or mechanical failures. Our joint venture, Point Lisas Nitrogen Limited, has experienced natural gas curtailments as discussed in the risk factor below titled “We are exposed to risks associated with our joint venture.” In addition, the transport of natural gas by pipeline is subject to additional risks, including delays or interruptions caused by capacity constraints, leaks or ruptures. Any delay or interruption in the delivery of natural gas or other raw materials, even for a limited period, could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our transportation and distribution activities rely on third party providers and are subject to environmental, safety and regulatory oversight. This exposes us to risks and uncertainties beyond our control that may adversely affect our operations and exposes us to additional liability.

We rely on railroad, truck, pipeline, river barge and ocean vessel companies to transport raw materials to our manufacturing facilities, to coordinate and deliver finished products to our distribution system and to ship finished products to our customers. We also lease rail cars in order to ship raw materials and finished products. These transportation operations, equipment and services are subject to various hazards, including adverse operating conditions on the inland waterway system, extreme weather conditions, system failures, work stoppages, delays, accidents such as spills and derailments and other accidents and operating hazards. Additionally, due to the aging infrastructure of certain rail lines, bridges, roadways, pipelines, river locks, and equipment that our third party service providers utilize, we may experience delays in both the receipt of raw materials or the shipment of finished product while repairs, maintenance or replacement activities are conducted. Also, certain third party service providers, particularly railroads, have experienced periodic service slowdowns due to capacity constraints in their systems, operational and maintenance difficulties and other events, which impact the shipping times of our products.

These transportation operations, equipment and services are also subject to environmental, safety, and regulatory oversight. Due to concerns related to accidents, discharges or other releases of hazardous substances, terrorism or the potential use of fertilizers as explosives, governmental entities could implement new or more stringent regulatory requirements affecting the transportation of raw materials or finished products.

If shipping of our products is delayed or we are unable to obtain raw materials as a result of these transportation companies’ failure to operate properly, or if new and more stringent regulatory requirements are implemented affecting transportation operations or equipment, or if there are significant increases in the cost of these services or equipment, our revenues and cost of operations could be adversely affected. In addition, increases in our transportation costs, or changes in such costs relative to transportation costs incurred by our competitors, could have a material adverse effect on our business, financial condition, results of operations and cash flows.

In the United States and Canada, the railroad industry continues various efforts to limit the railroads’ potential liability stemming from the transportation of Toxic Inhalation Hazard materials, such as the anhydrous ammonia we transport to and from our manufacturing and distribution facilities. For example, various railroads shift liability to shippers by contract, purport to shift liability to shippers by tariff, or otherwise seek to require shippers to indemnify and defend the railroads from and against liabilities (including in negligence, strict liability, or statutory liability) that may arise from certain acts or omissions of the railroads, third parties with insufficient resources, unknown causes or acts of god. These initiatives could materially and adversely affect our operating expenses and potentially our ability to transport anhydrous ammonia and increase our liability for releases of our anhydrous ammonia while in the care, custody and control of the railroads or third parties, for which our insurance may be insufficient or unavailable. New or more stringent regulatory requirements also could be implemented affecting the equipment used to ship our raw materials or finished products. Restrictions on service, increases in transportation costs, or changes in such costs relative to transportation costs incurred by our competitors, and any railroad industry initiatives that may impact our ability to transport our products, could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our operations and the production and handling of our products involve significant risks and hazards. We are not fully insured against all potential hazards and risks incident to our business. Therefore, our insurance coverage may not adequately cover our losses.

Our operations are subject to hazards inherent in the manufacture, transportation, storage and distribution of chemical products, including ammonia, which is highly toxic and corrosive. These hazards include: explosions; fires; severe weather and natural disasters; train derailments, collisions, vessel groundings and other transportation and maritime incidents; leaks and ruptures involving storage tanks, pipelines and rail cars; spills, discharges and releases of toxic or hazardous substances or gases; deliberate sabotage and terrorist incidents; mechanical failures; unscheduled plant downtime; labor difficulties and other risks. Some of these hazards can cause bodily injury and loss of life, severe damage to or destruction of property and equipment and environmental damage, and may result in suspension of operations for an extended period of time and/or the imposition of civil or criminal penalties and liabilities.

We maintain property, business interruption, casualty and liability insurance policies, but we are not fully insured against all potential hazards and risks incident to our business. If we were to incur significant liability for which we were not fully insured, it could have a material adverse effect on our business, financial condition, results of operations and cash flows. We are subject to various self-retentions, deductibles and limits under these insurance policies. The policies also contain exclusions and conditions that could have a material adverse impact on our ability to receive indemnification thereunder. Our policies are generally renewed annually. As a result of market conditions, our premiums, self-retentions and deductibles for certain insurance policies can increase substantially and, in some instances, certain insurance may become unavailable or available only for reduced amounts of coverage. In addition, significantly increased costs could lead us to decide to reduce, or possibly eliminate, coverage. There can be no assurance that we will be able to buy and maintain insurance with adequate limits and reasonable pricing terms and conditions.

In April 2013, there was a fire and explosion at the West Fertilizer Co. fertilizer storage and distribution facility in West, Texas. According to published reports, 15 people were killed and approximately 200 people were injured in the incident, and the fire and explosion damaged or destroyed a number of homes and buildings around the facility. Various subsidiaries of CF Industries Holdings, Inc. (the CF Entities) were named as defendants along with other companies in lawsuits filed in 2013, 2014 and 2015 in the District Court of McLennan County, Texas by the City of West, individual residents of the County and other parties seeking recovery for damages allegedly sustained as a result of the explosion. The cases were consolidated for discovery and pretrial proceedings in the District Court of McLennan County under the caption “In re: West Explosion Cases.”

The two-year statute of limitations expired on April 17, 2015. As of that date, over 400 plaintiffs had filed claims, including at least 9 entities, 325 individuals, and 80 insurance companies. Plaintiffs allege various theories of negligence, strict liability, and breach of warranty under Texas law. Although we do not own or operate the facility or directly sell our products to West Fertilizer Co., products that the CF Entities manufactured and sold to others were delivered to the facility and may have been stored at the West facility at the time of the incident. The Court granted in part and denied in part the CF Entities' Motions for Summary Judgment in August 2015. Over two hundred cases have been resolved pursuant to confidential settlements that have been or we expect will be fully funded by insurance. The remaining cases are in various stages of discovery and pre-trial proceedings. The next group of cases was reset for trial beginning on July 23, 2019. We believe we have strong legal and factual defenses and intend to continue defending the CF Entities vigorously in the pending lawsuits. The increased focus on the risks associated with fertilizers as a result of the incident could impact the regulatory environment and requirements applicable to fertilizer manufacturing and storage facilities.

Our substantial indebtedness could adversely affect our cash flow, prevent us from fulfilling our obligations and impair our ability to pursue or achieve other business objectives.

As of December 31, 2018, we had approximately $4.70 billion of total funded indebtedness, consisting primarily of secured and unsecured senior notes with varying maturity dates between 2020 and 2044, or approximately 45% of our total capitalization, and an additional $746 million of senior secured borrowing availability (reflecting no outstanding borrowings and $4 million of outstanding letters of credit) under our senior secured revolving credit agreement (as amended, the Revolving Credit Agreement). Our substantial debt service obligations will have an impact on our earnings and cash flow for so long as the indebtedness is outstanding.

Our substantial indebtedness could, through the operation of the financial and other restrictive covenants to which we are subject under the agreements and instruments governing that indebtedness and otherwise, have important consequences. For example, it could:

- make it more difficult for us to pay or refinance our debts as they become due during adverse economic and industry conditions because any related decrease in revenues could cause us not to have sufficient cash flows from operations to make our scheduled debt payments;
- cause us to be less able to take advantage of significant business opportunities, such as acquisition opportunities, and to react to changes in market or industry conditions;
- cause us to use a portion of our cash flow from operations for debt service, reducing the availability of cash to fund working capital and capital expenditures, and other business activities;
- cause us to be more vulnerable to general adverse economic and industry conditions;
- expose us to the risk of increased interest rates because certain of our borrowings, including borrowings under our Revolving Credit Agreement, could be at variable rates of interest;
- make us more leveraged than some of our competitors, which could place us at a competitive disadvantage;
- restrict our investments in our subsidiaries, which could limit our ability to fund certain of our businesses;
- restrict our ability to dispose of assets or otherwise restrict our use of funds from the disposal of assets;
- restrict our ability to pay dividends on our common stock or utilize excess cash to repurchase shares of our common stock;
- limit our ability to borrow additional monies in the future to fund working capital, capital expenditures and other general corporate purposes; and
- result in a downgrade in the credit rating of our indebtedness which could increase the cost of further borrowings.

We expect to consider options to refinance our outstanding indebtedness from time to time. Our ability to obtain any financing, whether through the issuance of new debt securities or otherwise, and the terms of any such financing are dependent on, among other things, our financial condition, financial market conditions within our industry and generally, credit ratings and numerous other factors, including factors beyond our control. Consequently, in the event that we need to access the credit markets, including to refinance our debt, there can be no assurance that we will be able to obtain financing on acceptable terms or within an acceptable timeframe, if at all. An inability to obtain financing with acceptable terms when needed could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our Revolving Credit Agreement and the terms of our outstanding indebtedness impose significant operating and financial restrictions on us and our subsidiaries, which may prevent us from capitalizing on business opportunities.

Our Revolving Credit Agreement imposes significant operating and financial restrictions on us. These restrictions include covenants limiting our ability and the ability of our subsidiaries (other than certain excluded subsidiaries) to, among other things:

- incur additional indebtedness or guarantee indebtedness;
- pay dividends on, repurchase or make distributions in respect of their capital stock or make other restricted payments;
- make certain investments or acquisitions;
- sell, transfer or otherwise convey certain assets;
- create liens;
- consolidate, merge, sell or otherwise dispose of all or substantially all of our and our restricted subsidiaries' assets; and
- prepay certain kinds of indebtedness.

In addition, our Revolving Credit Agreement requires us to comply with consolidated interest coverage ratio, total debt to capital ratio, and consolidated secured leverage ratio maintenance covenants.

Certain of these restrictions could be suspended if and for so long as we satisfy certain investment grade corporate rating and consolidated leverage tests. However, we cannot assure you that we will meet these tests or, if we do, that we will be able to maintain compliance with those conditions.

As a result of these restrictions and covenants under our existing indebtedness, including our senior secured notes, we are limited as to how we conduct our business and we may be unable to raise additional debt financing to compete effectively or to take advantage of new business opportunities. The terms of any future indebtedness we may incur could include additional or more restrictive covenants. We cannot assure you that we will be able to maintain compliance with the covenants under the terms of our indebtedness or, if we fail to do so, that we will be able to obtain waivers from the lenders and/or amend such covenants.

We may incur additional indebtedness in the future.

The terms of our existing indebtedness allow us to incur additional debt in the future, including additional secured and unsecured indebtedness. The indentures governing our senior secured notes do not limit incurrence by us of additional unsecured indebtedness, and will permit us to incur additional secured indebtedness subject to certain restrictions. Although our Revolving Credit Agreement contains restrictions on our ability to incur additional secured and unsecured indebtedness, these restrictions are subject to exceptions and qualifications, which allow us to incur additional secured and unsecured indebtedness in limited amounts. If we incur additional indebtedness, the risks that we face as a result of our leverage could intensify. If our financial condition or operating results deteriorate, our relations with our creditors, including the holders of our outstanding debt securities, the lenders under our Revolving Credit Agreement and our suppliers, may be materially and adversely affected.

A breach of the covenants under any of the agreements governing our indebtedness could result in an event of default under such agreements.

Our ability to comply with the covenants in the agreements and instruments governing our indebtedness will depend upon our future performance and various other factors, such as market prices for our nitrogen products, natural gas prices and other business, competitive and regulatory factors, many of which are beyond our control. We may not be able to maintain compliance with all of these covenants. In that event, we would need to seek an amendment to our debt agreements or would need to refinance our indebtedness. There can be no assurance that we can obtain future amendments or waivers of our debt agreements and instruments, or refinance our debt, and, even if we were able to do so, such relief might only last for a limited period, potentially necessitating additional amendments, waivers or refinancings. Any noncompliance by us with the covenants under our debt agreements and instruments could result in an event of default under those debt agreements and instruments. An event of default under an agreement or instrument governing any of our indebtedness may allow our creditors to accelerate the related debt and may result in the acceleration of any other debt to which a cross-acceleration or cross-default provision applies. If our lenders or holders of our debt securities accelerate the repayment of borrowings, we may be forced to liquidate certain assets to repay all or part of our indebtedness, which could materially and adversely impair our business operations. An event of default under our Revolving Credit Agreement would permit the lenders thereunder to terminate all commitments to extend further credit under our Revolving Credit Agreement. Furthermore, our Revolving Credit Agreement and senior secured notes provide for liens on specified collateral to secure our obligations thereunder, and if we were unable to repay amounts due and payable under our Revolving Credit Agreement or the senior secured notes, our Revolving Credit Agreement lenders or holders of the senior secured notes, as applicable, could proceed against the collateral granted to them, which could have a material adverse effect on our business, financial condition and results of operations. In the event our creditors accelerate the repayment of our indebtedness, we cannot assure that we would have sufficient assets to make such repayment.

Potential future downgrades of our credit ratings could adversely affect our access to capital and could otherwise have a material adverse effect on us.

As of February 14, 2019, our corporate credit rating by S&P Global Ratings is BB+ with a stable outlook; our corporate credit rating by Moody's Investor Services, Inc. is Ba2 with a stable outlook; and our corporate credit rating with Fitch Ratings, Inc. is BB+ with a stable outlook.

These ratings and our current credit condition affect, among other things, our ability to access new capital, especially debt, and negative changes in these ratings may result in more stringent covenants and higher interest rates under the terms of any new debt. Our credit ratings were downgraded in 2016 and rating agencies could further downgrade our credit ratings or issue adverse commentaries in the future, which could have a material adverse effect on our business, results of operations, financial condition and liquidity. In particular, a weakening of our financial condition, including a significant increase in our leverage or decrease in our profitability or cash flows, could adversely affect our ability to obtain necessary funds, result in a credit rating downgrade or change in outlook, or otherwise increase our cost of borrowing.

Cyber security risks could result in disruptions in business operations and adverse operating results.

We rely on internal and third-party information technology and computer control systems in many aspects of our business, including internal and external communications, the management of our accounting, financial and supply chain functions and plant operations. Business and supply chain disruptions, plant and utility outages and information technology system and network disruptions due to cyber attacks could seriously harm our operations and materially adversely affect our operating results. Cyber security risks include attacks on information technology and infrastructure by hackers, damage or loss of information due to viruses, the unintended disclosure of confidential information, the misuse or loss of control over computer control systems, and breaches due to employee error. Our exposure to cyber security risks includes exposure through third parties, including any cloud-based technologies, on whose systems we place significant reliance for the conduct of our business. We routinely review and implement security procedures and measures in order to protect our systems and information from being vulnerable to evolving cyber attacks. We believe these measures and procedures are appropriate. However, we may not have the resources or technical sophistication to anticipate, prevent, or recover from rapidly evolving types of cyber attacks. Compromises to our information and control systems could have severe financial and other business implications.

Adverse weather conditions may decrease demand for our fertilizer products, increase the cost of natural gas or materially disrupt our operations.

Weather conditions that delay or disrupt field work during the planting, growing, harvesting or application periods may cause agricultural customers to use different forms of nitrogen fertilizer, which may adversely affect demand for the forms that we sell or may impede farmers from applying our fertilizers until the following application period, resulting in lower seasonal demand for our products.

Adverse weather conditions during or following harvest may delay or eliminate opportunities to apply fertilizer in the fall. Weather can also have an adverse effect on crop yields, which could lower the income of growers and impair their ability to purchase fertilizer from our customers. Adverse weather conditions could also impact transportation of fertilizer, which could disrupt our ability to deliver our products to customers on a timely basis. Our quarterly financial results can vary significantly from one year to the next due to weather-related shifts in planting schedules and purchasing patterns. Over the longer-term, changes in weather patterns may shift the periods of demand for products and even the regions to which our products are distributed, which could require us to evolve our distribution system.

In addition, we use the North American waterway system extensively to ship products from some of our manufacturing facilities to our distribution facilities and our customers, and we also export nitrogen fertilizer products via seagoing vessels from deep-water docking facilities at certain of our manufacturing sites. Therefore, persistent significant changes in river or ocean water levels (either up or down, such as a result of flooding or drought for example), may require changes to our operating and distribution activities and/or significant capital improvements to our facilities.

Weather conditions or, in certain cases, weather forecasts, also can affect the price of natural gas, the principal raw material used to make our nitrogen fertilizer products. Colder and/or longer than normal winters and warmer than normal summers increase the demand for natural gas for power generation and for residential and industrial use, which can increase the cost and/or decrease the availability of natural gas. In addition, adverse weather events such as very low temperatures leading to well freeze-offs or hurricanes affecting the Gulf of Mexico coastal states can impact the supply of natural gas and cause prices to rise.

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Tax matters, including changes in tax laws or rates, adverse determinations by taxing authorities and imposition of new taxes could adversely affect our results of operations and financial condition.

We are subject to taxes in the United States, where most of our operations are located, and numerous foreign jurisdictions where our subsidiaries are organized. Tax rates in various jurisdictions in which we operate may be subject to significant change. Our future effective tax rate could be affected by changes in our mix of earnings from countries with differing statutory tax rates and tax systems, changes in valuation of deferred tax assets and liabilities or changes in tax laws or their interpretation.

We are also subject to regular reviews, examinations and audits by the IRS and other taxing authorities with respect to taxes inside and outside of the United States. Although we believe our tax estimates are reasonable, if a taxing authority disagrees with the positions we have taken, we could face additional tax liability, including interest and penalties. There can be no assurance that payment of such additional amounts upon final adjudication of any disputes will not have a material impact on our results of operations and financial condition.

We have used the cash we generate outside the United States primarily to fund development of our business in non-U.S. jurisdictions. If the funds generated by our U.S. business are not sufficient to meet our need for cash in the United States, we may need to repatriate a portion of our future international earnings to the United States. Under the tax laws of the foreign countries in which we operate, those international earnings would be subject to withholding taxes when repatriated; therefore, the repatriation of those earnings could result in an increase in our worldwide effective tax rate and an increase in our use of cash to pay these taxes.

We also need to comply with other new, evolving or revised tax laws and regulations. The enactment of, or increases in, tariffs or value added taxes, or other changes in the application of existing taxes, in markets in which we are currently active, or may be active in the future, or on specific products that we sell or with which our products compete, could have an adverse effect on our results of operations and financial condition.

On December 22, 2017, the President of the United States signed into law the Tax Cut and Jobs Act of 2017 (the “Tax Act” or “Tax Reform”). The Tax Act significantly changes how the U.S. taxes corporations. The Tax Act requires complex computations to be performed that were not previously required in U.S. tax law, significant judgments to be made in interpretation of the provisions of the Tax Act and significant estimates in calculations, and the preparation and analysis of information not previously relevant or regularly produced. The U.S. Treasury Department, the IRS, and other standard-setting bodies are in the process of issuing guidance on how the provisions of the Tax Act will be applied or otherwise administered that could be different from the interpretation currently reflected in our financial statements or tax returns. As new or amended guidance is issued with respect to the Tax Act, we may need to record adjustments to amounts previously recorded for taxes and such adjustments could have a material impact on our provision for income taxes in the period in which such adjustments are made.

In addition, foreign governments may enact tax laws in response to the Tax Act that could result in further changes to global taxation and materially affect our financial position and results of operations.

The United States and other countries in which we operate are in the process of implementing the Organization for Economic Co-operation and Development’s Base Erosion and Profit Shifting Project (BEPS). BEPS is intended to improve tax disclosure and transparency and eliminate structures and activities that could be perceived by a particular country as resulting in tax avoidance. Each country is permitted to introduce its own legislation to implement BEPS. As a number of our business operations do business across country lines, we are subject to BEPS. The implementation of BEPS could result in tax changes and may adversely affect our provision for income taxes, results of operations and cash flows.

We are reliant on a limited number of key facilities.

Our nitrogen fertilizer operations are located at nine separate nitrogen complexes, the largest of which is the Donaldsonville complex, which represented approximately 40% of our ammonia production capacity as of December 31, 2018. The suspension of operations at any of these complexes could adversely affect our ability to produce our products and fulfill our commitments, and could have a material adverse effect on our business, financial condition, results of operations and cash flows. In addition, our Donaldsonville complex is located in an area of the United States that experiences a relatively high level of hurricane or high wind activity and several of our complexes are located in areas that experience severe weather. Such storms, depending on their severity and location, have the potential not only to damage our facilities and disrupt our operations, but also to affect adversely the shipping and distribution of our products. Moreover, our facilities may be subject to failure of equipment that may be difficult to replace or have long delivery lead times and could result in operational disruptions.

We are subject to numerous environmental, health and safety laws, regulations and permitting requirements, as well as potential environmental liabilities, which may require us to make substantial expenditures.

We are subject to numerous environmental, health and safety laws and regulations in the United States, Canada, the United Kingdom, the European Union and the Republic of Trinidad and Tobago, including laws and regulations relating to the generation and handling of hazardous substances and wastes; the cleanup of hazardous substance releases; the discharge of regulated substances to air or water; and the demolition of existing plant sites upon permanent closure. In the United States, these laws include the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Toxic Substances Control Act and various other federal, state, provincial, local and international laws. As a producer of nitrogen fertilizer products working with hazardous substances, our business faces risks of spills, discharges or other releases of those substances into the environment. Certain environmental laws, including CERCLA, impose joint and several liability, without regard to fault, for cleanup costs on persons who have disposed of or released hazardous substances into the environment. Given the nature of our business, we have incurred, are incurring currently, and are likely to incur periodically in the future, liabilities under CERCLA and other environmental cleanup laws at our current facilities or facilities previously owned by us or other acquired businesses, adjacent or nearby third-party facilities or offsite disposal locations. The costs associated with future cleanup activities that we may be required to conduct or finance may be material. Additionally, we may become liable to third parties for damages, including personal injury and property damage, resulting from the disposal or release of hazardous substances into the environment.

Violations of environmental, health and safety laws can result in substantial penalties, court orders to install pollution-control equipment, civil and criminal sanctions, permit revocations and facility shutdowns. Environmental, health and safety laws change regularly and have tended to become more stringent over time. As a result, we have not always been and may not always be in compliance with all environmental, health and safety laws and regulations. We may be subject to more stringent enforcement of existing or new environmental, health and safety laws in the future. Additionally, future environmental, health and safety laws and regulations or reinterpretation of current laws and regulations may require us to make substantial expenditures. Our costs to comply with, or any liabilities under, these laws and regulations could have a material adverse effect on our business, financial condition, results of operations and cash flows.

From time to time, our production of anhydrous ammonia has resulted in accidental releases that have temporarily disrupted our manufacturing operations and resulted in liability for administrative penalties and claims for personal injury. To date, our costs to resolve these liabilities have not been material. However, we could incur significant costs if our liability coverage is not sufficient to pay for all or a large part of any judgments against us, or if our insurance carrier refuses coverage for these losses.

We hold numerous environmental and other governmental permits and approvals authorizing operations at each of our facilities. Expansion or modification of our operations is predicated upon securing necessary environmental or other permits or approvals. A decision by a government agency to deny or delay issuing a new or renewed regulatory material permit or approval, or to revoke or substantially modify an existing permit or approval, or a determination that we have violated a law or permit as a result of a governmental inspection of our facilities could have a material adverse effect on our ability to continue operations at our facilities and on our business, financial condition, results of operations and cash flows.

Future regulatory restrictions on greenhouse gas (GHG) emissions in the jurisdictions in which we operate could materially adversely affect our business, financial condition, results of operations and cash flows.

We are subject to GHG regulations in the United Kingdom, Canada and the United States. In the United States, our existing facilities currently are only subject to GHG emissions reporting obligations, although our new and modified facilities are likely to be subject to GHG emissions standards included in their air permits. Our facilities in the United

Kingdom are subject to the European Union Emissions Trading System (EU ETS), which generally require us to hold or obtain emissions allowances to offset GHG emissions from those aspects of our operations that are subject to regulation under this program. The continued applicability of the EU ETS in the United Kingdom is uncertain due to the potential exit of the United Kingdom from the European Union (Brexit), which could result in more stringent GHG regulations than those imposed by the EU ETS.

Beginning in 2018, the Medicine Hat Nitrogen Complex, which had been subject to Alberta's Specified Gas Emitters Regulation, became subject to Alberta's new Carbon Competitiveness Incentive Regulation (CCIR). This regulation establishes product-specific benchmarks based on the most efficient GHG emitting facilities in a sector. A facility with emissions that exceed the applicable benchmark is required to take action to reduce its GHG emissions intensity, purchase emissions offsets or performance credits, or make contributions to Alberta's climate fund. The obligations under this regulation are being phased in over a three-year period and will be tightened over time. The federal government formally determined that Alberta's CCIR meets its stringency requirements and so will not impose the Output-Based Performance System (OBPS), also called the “federal backstop,” which is being implemented by Environment and Climate Change Canada (ECCC) pursuant to the federal Greenhouse Pollution Pricing Act (“GPPA”) that came into effect in June 2018. However, the government of Alberta has not determined whether it will agree to increase the effective price of carbon beyond the current price of $30 per ton of excess carbon dioxide equivalent (CO_2e). This could result in regulated facilities in Alberta being subject to the OBPS beginning in 2021, when the effective price of carbon pursuant to the GPPA rises to $40 per ton of excess CO_2e .

The Courtright Nitrogen Complex had been subject to Ontario’s GHG cap-and-trade program beginning in January 2017, but the new conservative government elected in June 2018 rescinded that program in one of its first acts. Because Ontario no longer has a GHG regulatory regime, the federal government imposed the OBPS in the province beginning in 2019. ECCC is currently proposing that the benchmark for nitrogen fertilizer plants will be set at 90% of the average performance of all Canadian fertilizer plants. A facility whose carbon emissions exceed this benchmark will be required to offset excess emissions by obtaining and retiring surplus emission credits; obtaining qualifying emission offsets; or paying a fee of $20 per ton of excess CO_2e for calendar year 2019, which fee will rise by $10 per ton each year through 2022. Ontario and Saskatchewan are challenging whether the federal government has jurisdiction to impose a federal carbon price on the provinces and territories.

There are substantial uncertainties as to the nature, stringency and timing of any future GHG regulations in other jurisdiction, including the United States. On December 12, 2015, 195 countries adopted by consensus a new international agreement known as the Paris Agreement. The Paris Agreement, which has been accepted by the United States and ratified by Canada and the United Kingdom, went into effect in November 2016. However, in June 2017, the United States announced its intention to withdraw from the Paris Agreement, subject to renegotiation of the Paris Agreement on terms more favorable to the United States. Under the terms of the Paris Agreement, the United States cannot formally provide notice of its withdrawal before November 2019, which would become effective one year after providing such notice. In the interim, it is unclear if the United States will comply with its commitments under the Paris Agreement. There has been no indication to date that the United States’ announced withdrawal is causing other countries to also consider withdrawing from the Paris Agreement. If the Paris Agreement remains in effect, it could result in more aggressive efforts to reduce GHG emissions in the jurisdictions in which we operate.

More stringent GHG regulations, if they are enacted, are likely to have a significant impact on us, because our production facilities emit GHGs such as carbon dioxide and nitrous oxide and because natural gas, a fossil fuel, is a primary raw material used in our nitrogen production process. Regulation of GHGs may require us to make changes in our operating activities that would increase our operating costs, reduce our efficiency, limit our output, require us to make capital improvements to our facilities, increase our costs for or limit the availability of energy, raw materials or transportation, or otherwise materially adversely affect our business, financial condition, results of operations and cash flows. In addition, to the extent that GHG restrictions are not imposed in countries where our competitors operate or are less stringent than regulations that may be imposed in the United States, Canada or the United Kingdom, our competitors may have cost or other competitive advantages over us.

We may not be successful in the expansion of our business.

We routinely consider possible expansions of our business, both within the United States and elsewhere. Major investments in our business, including as a result of acquisitions, partnerships, joint ventures, business combination transactions or other major investments require significant managerial resources, the diversion of which from our other activities may impair the operation of our business. We may be unable to identify or successfully compete for certain acquisition targets, which may hinder or prevent us from acquiring a target or completing other transactions. The risks of any expansion of our business through investments, acquisitions, partnerships, joint ventures or business combination transactions are increased due to the significant capital and other resources that we may have to commit to any such expansion, which may not be recoverable if the expansion initiative to which they were devoted is ultimately not implemented. As a result of these and other factors, including general economic risk, we may not be able to realize our projected returns from any future acquisitions, partnerships, joint ventures, business combination transactions or other major investments. Among the risks associated with the pursuit and consummation of acquisitions, partnerships, joint ventures or other major investments or business combination transactions are those involving:

- difficulties in integrating the parties' operations, systems, technologies, products and personnel;
- incurrence of significant transaction-related expenses;
- potential integration or restructuring costs;
- potential impairment charges related to the goodwill, intangible assets or other assets to which any such transaction relates, in the event that the economic benefits of such transaction prove to be less than anticipated;
- other unanticipated costs associated with such transactions;
- our ability to achieve operating and financial efficiencies, synergies and cost savings;

- our ability to obtain the desired financial or strategic benefits from any such transaction;
- the parties' ability to retain key business relationships, including relationships with employees, customers, partners and suppliers;
- potential loss of key personnel;
- entry into markets or involvement with products with which we have limited current or prior experience or in which competitors may have stronger positions;
- assumption of contingent liabilities, including litigation;
- exposure to unanticipated liabilities;
- differences in the parties' internal control environments, which may require significant time and resources to resolve in conformity with applicable legal and accounting standards;
- increased scope, geographic diversity and complexity of our operations;
- the tax effects of any such transaction; and
- the potential for costly and time-consuming litigation, including stockholder lawsuits.

International acquisitions, partnerships, joint ventures, business combinations or investments and other international expansions of our business involve additional risks and uncertainties, including, but not limited to:

- the impact of particular economic, tax, currency, political, legal and regulatory risks associated with specific countries;
- challenges caused by distance and by language and cultural differences;
- difficulties and costs of complying with a wide variety of complex laws, treaties and regulations;
- unexpected changes in regulatory environments;
- political and economic instability, including the possibility for civil unrest;
- nationalization of properties by foreign governments;
- tax rates that may exceed those in the United States, and earnings that may be subject to withholding requirements;
- the imposition of tariffs, exchange controls or other restrictions; and
- the impact of currency exchange rate fluctuations.

If we finance acquisitions, partnerships, joint ventures, business combination transactions or other major investments by issuing equity or convertible or other debt securities or loans, our existing stockholders may be diluted or we could face constraints under the terms of, and as a result of the repayment and debt-service obligations under, the additional indebtedness. A business combination transaction between us and another company could result in our stockholders receiving cash or shares of another entity on terms that such stockholders may not consider desirable. Moreover, the regulatory approvals associated with a business combination may result in divestitures or other changes to our business, the effects of which are difficult to predict.

Our operating results fluctuate due to seasonality. Our inability to predict future seasonal fertilizer demand accurately could result in our having excess inventory, potentially at costs in excess of market value, or product shortages.

The fertilizer business is seasonal. The degree of seasonality of our business can change significantly from year to year due to conditions in the agricultural industry and other factors. The strongest demand for our products in North America occurs during the spring planting season, with a second period of strong demand following the fall harvest. In contrast, we and other fertilizer producers generally manufacture and distribute products throughout the year. As a result, we and/or our customers generally build inventories during the low demand periods of the year to ensure timely product availability during the peak sales seasons. Seasonality is greatest for ammonia due to the short application season and the limited ability of our customers and their customers to store significant quantities of this product. The seasonality of fertilizer demand generally results in our sales volumes and net sales being the highest during the spring and our working capital requirements being the highest just prior to the start of the spring planting season.

If seasonal demand is less than we expect, we may be left with excess inventory that will have to be stored (in which case our results of operations will be negatively affected by any related increased storage costs) or liquidated (in which case the selling price may be below our production, procurement and storage costs). The risks associated with excess inventory and product shortages are exacerbated by the volatility of natural gas and nitrogen fertilizer prices and the relatively brief periods during which farmers can apply nitrogen fertilizers. If prices for our products rapidly decrease, we may be subject to inventory write-downs, adversely affecting our operating results. If seasonal demand is greater than we expect, we may experience product shortages, and customers of ours may turn to our competitors for products that they would otherwise have purchased from us.

A change in the volume of products that our customers purchase on a forward basis, or the percentage of our sales volume that is sold to our customers on a forward basis, could increase our exposure to fluctuations in our profit margins and materially adversely affect our business, financial condition, results of operations and cash flows.

We offer our customers the opportunity to purchase products from us on a forward basis at prices and delivery dates we propose. Under our forward sales programs, customers generally make an initial cash down payment at the time of order and pay the remaining portion of the contract sales value in advance of the shipment date. Forward sales improve our liquidity due to the cash payments received from customers in advance of shipment of the product and allow us to improve our production scheduling and planning and the utilization of our manufacturing and distribution assets.

Any cash payments received in advance from customers in connection with forward sales are reflected on our consolidated balance sheets as a current liability until the related orders are shipped, which can take up to several months.

We believe the ability to purchase products on a forward basis is most appealing to our customers during periods of generally increasing prices for nitrogen fertilizers. Our customers may be less willing or even unwilling to purchase products on a forward basis during periods of generally decreasing or stable prices or during periods of relatively high fertilizer prices due to the expectation of lower prices in the future or limited capital resources. In periods of rising fertilizer prices, selling our nitrogen fertilizers on a forward basis may result in lower profit margins than if we had not sold fertilizer on a forward basis. Conversely, in periods of declining fertilizer prices, selling our nitrogen fertilizers on a forward basis may result in higher profit margins than if we had not sold fertilizer on a forward basis. In addition, fixing the selling prices of our products, often months in advance of their ultimate delivery to customers, typically causes our reported selling prices and margins to differ from spot market prices and margins available at the time of shipment.

Our business is subject to risks involving derivatives and the risk that our hedging activities might not prevent losses.

We may utilize natural gas derivatives to hedge our financial exposure to the price volatility of natural gas, the principal raw material used in the production of nitrogen-based products. We have used futures, financial swaps and option contracts traded in the over-the-counter markets or on exchanges. In order to manage our exposure to changes in foreign currency exchange rates, from time to time, we may use foreign currency derivatives, primarily forward exchange contracts.

Our use of derivatives can result in volatility in reported earnings due to the unrealized mark-to-market adjustments that occur from changes in the value of the derivatives that do not qualify for, or to which we do not apply, hedge accounting. To the extent that our derivative positions lose value, we may be required to post collateral with our counterparties, adversely affecting our liquidity.

We have also used fixed-price, physical purchase and sales contracts to hedge our exposure to natural gas price volatility. Hedging arrangements are imperfect and unhedged risks will always exist. In addition, our hedging activities may themselves give rise to various risks that could adversely affect us. For example, we are exposed to counterparty credit risk when our derivatives are in a net asset position. The counterparties to our derivatives are multi-national commercial banks, major financial institutions or large energy companies.

Our liquidity could be negatively impacted by a counterparty default on settlement of one or more of our derivative financial instruments or by the trigger of any cross default provisions or credit support requirements. Additionally, the International Swaps and Derivative Association master netting arrangements for most of our derivative instruments contain credit-risk-related contingent features, such as cross default provisions and credit support requirements. In the event of certain defaults or a credit ratings downgrade, our counterparty may request early termination and net settlement of certain derivative trades or may require us to collateralize derivatives in a net liability position.

At other times we may not utilize derivatives or derivative strategies to hedge certain risks or to reduce the financial exposure of price volatility. As a result, we may not prevent certain material adverse impacts that could have been mitigated through the use of derivative strategies.

We are subject to risk associated with our strategic venture with CHS Inc.

We may not realize the full benefits from our strategic venture with CHS that are expected. The realization of the expected benefits of the CHS strategic venture depends on our ability to operate and manage the strategic venture successfully, and on the market prices of the nitrogen fertilizer products that are the subject of our supply agreement with CHS over the life of the agreement, among other factors. Additionally, any challenges related to the CHS strategic venture could harm our relationships with CHS or our other customers.

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We are exposed to risks associated with our joint venture.

We have a 50% ownership interest in PLNL, which owns and operates an ammonia production facility in the Republic of Trinidad and Tobago. Our joint venture partner shares a measure of control over the operations of our PLNL joint venture. As a result, our investment in our PLNL joint venture involves risks that are different from the risks involved in owning facilities and operations independently. These risks include the possibility that our PLNL joint venture or our partner: have economic or business interests or goals that are or become inconsistent with our economic or business interests or goals; are in a position to take action contrary to (or have veto rights over) our instructions, requests, policies or objectives; subject our PLNL joint venture to liabilities exceeding those contemplated; take actions that reduce our return on investment; or take actions that harm our reputation or restrict our ability to run our business.

In addition, we may become involved in disputes with our PLNL joint venture partner, which could lead to impasses or situations that could harm the joint venture, which could reduce our revenues or increase our costs.

PLNL's ammonia plant relies on natural gas supplied, under a Gas Sales Contract (the NGC Contract), by the National Gas Company of Trinidad and Tobago Limited (NGC). The joint venture experienced past curtailments in the supply of natural gas from NGC, which reduced the ammonia production at PLNL. The NGC Contract had an initial expiration date of September 2018 and was extended on the same terms until September 2023. Any NGC commitment to supply gas beyond 2023 will be based on new agreements. In May 2018, the NGC and PLNL reached a settlement of an arbitration proceeding regarding PLNL's claims for damages due to natural gas supply curtailments.

As part of our impairment assessments of our equity method investment in PLNL, we determined the carrying value exceeded the fair value and recognized a $134 million impairment charge in 2016 and a $62 million impairment charge in 2015 related to our equity method investment in PLNL. The carrying value of our equity method investment in PLNL at December 31, 2018 is $93 million. Failure to secure a long-term gas supply from NGC after 2023 on a cost effective basis could adversely affect our ability to produce ammonia at the joint venture and could result in further impairment to the value of the joint venture, such as ceasing operations and writing off the remaining investment in PLNL, which could have a material adverse effect on our results of operations.

Acts of terrorism and regulations to combat terrorism could negatively affect our business.

Like other companies with major industrial facilities, we may be targets of terrorist activities. Many of our plants and facilities store significant quantities of ammonia and other materials that can be dangerous if mishandled. Any damage to infrastructure facilities, such as electric generation, transmission and distribution facilities, or injury to employees, who could be direct targets or indirect casualties of an act of terrorism, may affect our operations. Any disruption of our ability to produce or distribute our products could result in a significant decrease in revenues and significant additional costs to replace, repair or insure our assets, which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Due to concerns related to terrorism or the potential use of certain fertilizers as explosives, we are subject to various security laws and regulations. In the United States, these security laws include the Maritime Transportation Security Act of 2002 and the Chemical Facilities Anti-Terrorism Standards regulation. In addition, President Obama issued in 2013 Executive Order 13650 Improving Chemical Facility Safety and Security to improve chemical facility safety in coordination with owners and operators. Governmental entities could implement new or impose more stringent regulations affecting the security of our plants, terminals and warehouses or the transportation and use of fertilizers. These regulations could result in higher operating costs or limitations on the sale of our products and could result in significant unanticipated costs, lower revenues and reduced profit margins. We manufacture and sell certain nitrogen products that can be used as explosives. It is possible that governmental entities in the United States or elsewhere could impose additional limitations on the use, sale or distribution of nitrogen products, thereby limiting our ability to manufacture or sell those products, or that illicit use of our products could result in liability for us.

In October 2016, the Department of Homeland Security (DHS) released its new Chemical Security Assessment Tool (CSAT 2.0) surveys and enhanced risk tiering methodology. Facilities that had previously submitted a survey response to the DHS were notified to resubmit responses to online questionnaires to be evaluated through the revised and enhanced risk tiering methodology. In April 2017, the DHS began sending tiering determination letters to chemical facilities based on the new methodology. Depending on the risk classification resulting from the application of CSAT 2.0, our plants and terminals could be subject to more stringent requirements related to chemical security.

We are subject to risks associated with international operations.

Our international business operations are subject to numerous risks and uncertainties, including difficulties and costs associated with complying with a wide variety of complex laws, treaties and regulations; unexpected changes in regulatory environments; currency fluctuations; tax rates that may exceed those in the United States; earnings that may be subject to withholding requirements; and the imposition of tariffs, exchange controls or other restrictions. Changes in governmental trade policies can lead to the imposition of new duties, tariffs or quotas affecting agricultural commodities, fertilizer or industrial products. These can alter trade flows, access to supplies or demand, and regional balances for our products.

Our principal reporting currency is the U.S. dollar and our business operations and investments outside the United States increase our risk related to fluctuations in foreign currency exchange rates. The main currencies to which we are exposed, besides the U.S. dollar, are the Canadian dollar, the British pound and the euro. These exposures may change over time as business practices evolve and economic conditions change, including, for example, in response to sudden global economic conditions resulting from measures like the referendum in the United Kingdom in June 2016, which resulted in a vote in favor of exiting the European Union (Brexit), which is further discussed below. We may selectively reduce some foreign currency exchange rate risk by, among other things, requiring contracted purchases of our products to be settled in, or indexed to, the U.S. dollar or a currency freely convertible into U.S. dollars, or hedging through foreign currency derivatives. These efforts, however, may not be effective and could have a material adverse effect on our business, financial condition, results of operations and cash flows.

With regard to Brexit, a process of negotiation is now taking place to determine the future terms of the United Kingdom's relationship with the European Union, with the United Kingdom due to exit the European Union on March 29, 2019. We operate two nitrogen manufacturing facilities in the United Kingdom, which utilize foreign-sourced materials and equipment, and which also export products in addition to serving customers in the United Kingdom. Brexit, including its indirect effects, could impact us in the future. For example, the cost and availability of natural gas or other raw materials or equipment that we purchase and the demand or selling prices for the nitrogen products that we sell, could be impacted by changes in tariffs, duties, trade restrictions or other factors. Brexit could lead to changes in trade flows, trading relationships, the movement of production to alternative locations, or the curtailment of certain production at certain sites. It could also lead to changes in the regulatory environment in which we operate, including the risk of more stringent restrictions on GHG emissions, as discussed above. Brexit could also impact foreign exchange rates or U.K. interest rates, which could impact our operations or the valuation of our assets and liabilities. Since the U.K. referendum in June 2016, the United Kingdom has experienced increases in the volatility of foreign exchange rates, which impacts our operations as discussed above. As a result of the uncertainty of Brexit, including its indirect effects, changes in the future profitability, asset utilization, or business valuation of our U.K. operations could negatively impact us and may result in an impairment of our long-lived assets or goodwill. As of December 31, 2018, long-lived assets, including property, plant and equipment and intangible assets, and goodwill related to the United Kingdom were $742 million and $264 million, respectively.

We are subject to anti-corruption laws and regulations and economic sanctions programs in various jurisdictions, including the U.S. Foreign Corrupt Practices Act of 1977, the United Kingdom Bribery Act of 2010, the Canadian Corruption of Foreign Public Officials Act, and economic sanctions programs administered by the United Nations, the European Union and the Office of Foreign Assets Control of the U.S. Department of the Treasury, and regulations set forth under the Comprehensive Iran Accountability Divestment Act. As a result of doing business internationally, we are exposed to a risk of violating anti-corruption laws and sanctions regulations applicable in those countries where we, our partners or agents operate. Violations of anti-corruption and sanctions laws and regulations are punishable by civil penalties, including fines, denial of export privileges, injunctions, asset seizures, debarment from government contracts (and termination of existing contracts) and revocations or restrictions of licenses, as well as criminal fines and imprisonment. The violation of applicable laws by our employees, consultants, agents or partners could subject us to penalties and could have a material adverse effect on our business, financial condition, results of operations and cash flows.

We are subject to antitrust and competition laws in various countries throughout the world. We cannot predict how these laws or their interpretation, administration and enforcement will change over time. Changes in antitrust laws globally, or in their interpretation, administration or enforcement, may limit our existing or future operations and growth.

Deterioration of global market and economic conditions could have a material adverse effect on our business, financial condition, results of operations and cash flows.

A slowdown of, or persistent weakness in, economic activity caused by a deterioration of global market and economic conditions could adversely affect our business in the following ways, among others: conditions in the credit markets could affect the ability of our customers and their customers to obtain sufficient credit to support their operations; the failure of our customers to fulfill their purchase obligations could result in increases in bad debts and impact our working capital; and the failure of certain key suppliers could increase our exposure to disruptions in supply or to financial losses. We also may experience declining demand and falling prices for some of our products due to our customers' reluctance to replenish inventories. Changes in global economic conditions can arise suddenly and the full impact of such changes can be difficult to ascertain, resulting in anxiety among market participants that can persist for protracted periods. For example, concern and uncertainty over the potential impact of Brexit on the global economy has resulted in increased volatility in global financial markets. The overall impact of changes in global economic conditions on us is difficult to predict, and our business could be materially adversely impacted.

FORWARD LOOKING STATEMENTS

From time to time, in this Annual Report on Form 10-K as well as in other written reports and oral statements, we make forward-looking statements that are not statements of historical fact and may involve a number of risks and uncertainties. These statements relate to analyses and other information that are based on forecasts of future results and estimates of amounts not yet determinable. These statements may also relate to our prospects, future developments and business strategies. We have used the words “anticipate,” “believe,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “predict,” “project,” “will” or “would” and similar terms and phrases, including references to assumptions, to identify forward-looking statements in this document. These forward-looking statements are made based on currently available competitive, financial and economic data, our current expectations, estimates, forecasts and projections about the industries and markets in which we operate and management’s beliefs and assumptions concerning future events affecting us. These statements are not guarantees of future performance and are subject to risks, uncertainties and factors relating to our operations and business environment, all of which are difficult to predict and many of which are beyond our control. Therefore, our actual results may differ materially from what is expressed in or implied by any forward-looking statements. We want to caution you not to place undue reliance on any forward-looking statements. We do not undertake any responsibility to release publicly any revisions to these forward-looking statements to take into account events or circumstances that occur after the date of this document. Additionally, we do not undertake any responsibility to provide updates regarding the occurrence of any unanticipated events which may cause actual results to differ from those expressed or implied by the forward-looking statements contained in this document.

Important factors that could cause actual results to differ materially from our expectations are disclosed under “Risk Factors” and elsewhere in this Annual Report on Form 10-K. Such factors include, among others:

- the cyclical nature of our business and the impact of global supply and demand on our selling prices;
- the global commodity nature of our fertilizer products, the conditions in the international market for nitrogen products, and the intense global competition from other fertilizer producers;
- conditions in the U.S. and European agricultural industry;
- the volatility of natural gas prices in North America and Europe;
- difficulties in securing the supply and delivery of raw materials, increases in their costs or delays or interruptions in their delivery;
- reliance on third party providers of transportation services and equipment;
- the significant risks and hazards involved in producing and handling our products against which we may not be fully insured;
- our ability to manage our indebtedness;
- operating and financial restrictions imposed on us by the agreements governing our senior secured indebtedness;
- risks associated with our incurrence of additional indebtedness;
- our ability to maintain compliance with covenants under the agreements governing our indebtedness;
- downgrades of our credit ratings;
- risks associated with cyber security;
- weather conditions;
- risks associated with changes in tax laws and disagreements with taxing authorities;
- our reliance on a limited number of key facilities;
- potential liabilities and expenditures related to environmental, health and safety laws and regulations and permitting requirements;
- future regulatory restrictions and requirements related to greenhouse gas emissions;
- risks associated with expansions of our business, including unanticipated adverse consequences and the significant resources that could be required;

- the seasonality of the fertilizer business;
- the impact of changing market conditions on our forward sales programs;
- risks involving derivatives and the effectiveness of our risk measurement and hedging activities;
- risks associated with the operation or management of the CHS strategic venture, risks and uncertainties relating to the market prices of the fertilizer products that are the subject of our supply agreement with CHS over the life of the supply agreement, and the risk that any challenges related to the CHS strategic venture will harm our other business relationships;
- risks associated with our PLNL joint venture;
- acts of terrorism and regulations to combat terrorism;
- risks associated with international operations; and
- deterioration of global market and economic conditions.

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ITEM 1B. UNRESOLVED STAFF COMMENTS.

None.

ITEM 2. PROPERTIES.

Information regarding our facilities and properties is included in Item 1. Business—Reportable Segments and Item 1. Business—Storage Facilities and Other Properties.

Certain of our distribution and storage facilities in the United States are subject to mortgages securing obligations under the Revolving Credit Agreement and our senior secured notes. For additional information, see Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations—Liquidity and Capital Resources—Debt.

ITEM 3. LEGAL PROCEEDINGS.

Litigation

West Fertilizer Co.

On April 17, 2013, there was a fire and explosion at the West Fertilizer Co. fertilizer storage and distribution facility in West, Texas. According to published reports, 15 people were killed and approximately 200 people were injured in the incident, and the fire and explosion damaged or destroyed a number of homes and buildings around the facility. Various subsidiaries of CF Industries Holdings, Inc. (the CF Entities) were named as defendants along with other companies in lawsuits filed in 2013, 2014 and 2015 in the District Court of McLennan County, Texas by the City of West, individual residents of the County and other parties seeking recovery for damages allegedly sustained as a result of the explosion. The cases were consolidated for discovery and pretrial proceedings in the District Court of McLennan County under the caption "In re: West Explosion Cases." The two-year statute of limitations expired on April 17, 2015. As of that date, over 400 plaintiffs had filed claims, including at least 9 entities, 325 individuals, and 80 insurance companies. Plaintiffs allege various theories of negligence, strict liability, and breach of warranty under Texas law. Although we do not own or operate the facility or directly sell our products to West Fertilizer Co., products that the CF Entities manufactured and sold to others were delivered to the facility and may have been stored at the West facility at the time of the incident.

The Court granted in part and denied in part the CF Entities' Motions for Summary Judgment in August 2015. Over two hundred cases have been resolved pursuant to confidential settlements that have been or we expect will be fully funded by insurance. The remaining cases are in various stages of discovery and pre-trial proceedings. The next group of cases was reset for trial beginning on July 23, 2019. We believe we have strong legal and factual defenses and intend to continue defending the CF Entities vigorously in the pending lawsuits. The Company cannot provide a range of reasonably possible loss due to the lack of damages discovery for many of the remaining claims and the uncertain nature of this litigation, including uncertainties around the potential allocation of responsibility by a jury to other defendants or responsible third parties. The recognition of a potential loss in the future in the West Fertilizer Co. litigation could negatively affect our results in the period of recognition. However, based upon currently available information, including available insurance coverage, we do not believe that this litigation will have a material adverse effect on our consolidated financial position, results of operations or cash flows.

Environmental

Florida Environmental Matters

On March 17, 2014, we completed the sale of our phosphate mining and manufacturing business, which was located in Florida, to Mosaic. Pursuant to the terms of the definitive agreement executed in October 2013 among CF Industries Holdings, Inc., CF Industries and Mosaic, Mosaic assumed the following environmental matters and we agreed to indemnify Mosaic with respect to losses arising out of the matters below, subject to a maximum indemnification cap and the other terms of the definitive agreement.

Clean Air Act Notice of Violation

We received a Notice of Violation (NOV) from the EPA by letter dated June 16, 2010, alleging that we violated the Prevention of Significant Deterioration Clean Air Act regulations relating to certain projects undertaken at the former Plant City, Florida facility's sulfuric acid plants. This NOV further alleges that the actions that are the basis for the alleged PSD violations also resulted in violations of Title V air operating permit regulations. Finally, the NOV alleges that we failed to comply with certain compliance dates established by hazardous air pollutant regulations for phosphoric acid manufacturing plants and phosphate fertilizer production plants. We had several meetings with the EPA with respect to this matter prior to our sale of the phosphate mining and manufacturing business in March 2014. We and Mosaic have separately had continued discussions with the EPA subsequent to our sale of the phosphate mining and manufacturing business with respect to this matter. We do not know at this time if this matter will be settled prior to initiation of formal legal action.

We cannot estimate the potential penalties, fines or other expenditures, if any, that may result from the Clean Air Act NOV and, therefore, we cannot determine if the ultimate outcome of this matter will have a material impact on our consolidated financial position, results of operations or cash flows.

EPCRA/CERCLA Notice of Violation

By letter dated July 6, 2010, the EPA issued a NOV to us alleging violations of Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) in connection with the former Plant City facility. EPCRA requires annual reports to be submitted with respect to the use of certain toxic chemicals. The NOV also included an allegation that we violated Section 304 of EPCRA and Section 103 of CERCLA by failing to file a timely notification relating to the release of hydrogen fluoride above applicable reportable quantities. We do not know at this time if this matter will be settled prior to initiation of formal legal action.

We do not expect that penalties or fines, if any, that may arise out of the EPCRA/CERCLA matter will have a material impact on our consolidated financial position, results of operations or cash flows.

Other Environmental Matters

For information on pending proceedings relating to environmental remediation matters, see Item 1. Business—Environmental, Health and Safety and Note 20—Contingencies to our consolidated financial statements included in Item 8 of this report.

ITEM 4. MINE SAFETY DISCLOSURES.

Not applicable.

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CF INDUSTRIES HOLDINGS, INC.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES.

Our common stock is traded on the New York Stock Exchange under the symbol "CF". As of February 14, 2019, there were 715 stockholders of record.

The following table sets forth stock repurchases for each of the three months of the quarter ended December 31, 2018:

	Issuer Purchases of Equity Securities			
Period	Total number of shares (or units) purchased	Average price paid per share (or unit) [1]	Total number of shares (or units) purchased as part of publicly announced plans or programs[2]	Maximum number (or approximate dollar value) of shares (or units) that may yet be purchased under the plans or programs (in thousands)[2]
October 1, 2018 - October 31, 2018	1,120,819[3]	$ 49.73	1,120,000	$ 353,178
November 1, 2018 - November 30, 2018	3,632,912[4]	46.78	3,586,618	185,653
December 1, 2018 - December 31, 2018	4,409,484	42.10	4,409,484	—
Total	9,163,215	$ 44.89	9,116,102	

(1) Average price paid per share of CF Holdings common stock repurchased under the 2018 Share Repurchase Program, as defined below, is the execution price, excluding commissions paid to brokers.

(2) On August 1, 2018, our Board of Directors authorized management to repurchase CF Industries Holdings, Inc. (CF Holdings) common stock for a total expenditure of up to $500 million through June 30, 2020 (the 2018 Share Repurchase Program). We announced the 2018 Share Repurchase Program on August 1, 2018, and we completed the 2018 Share Repurchase Program in the fourth quarter of 2018. The 2018 Share Repurchase Program is discussed in Note 18—Stockholders' Equity, in the notes to the consolidated financial statements included in Item 8. Financial Statements and Supplementary Data.

(3) Includes 819 shares withheld to pay employee tax obligations upon the lapse of restrictions on restricted stock units.

(4) Includes 46,294 shares withheld to pay employee tax obligations upon the exercise of nonqualified stock options.

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CF INDUSTRIES HOLDINGS, INC.

ITEM 6. SELECTED FINANCIAL DATA.

The following selected historical financial data as of December 31, 2018 and 2017 and for the years ended December 31, 2018, 2017 and 2016 have been derived from our audited consolidated financial statements and related notes included elsewhere in this document. The following selected historical financial data as of December 31, 2016, 2015 and 2014 and for the years ended December 31, 2015 and 2014 have been derived from our consolidated financial statements that are not included in this document. The selected historical financial data should be read in conjunction with the information contained in Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations and Item 8. Financial Statements and Supplementary Data.

	Year ended December 31,				
	2018	2017[1]	2016[1]	2015[1][2]	2014[1][3]
	(in millions, except per share amounts)				
Statement of Operations Data:					
Net sales	$4,429	$4,130	$3,685	$ 4,308	$ 4,743
Cost of sales	3,512	3,696	2,842	2,752	2,953
Gross margin	917	434	843	1,556	1,790
Selling, general and administrative expenses	214	191	173	169	147
Transaction costs	—	—	179	57	—
Other operating—net	(27)	18	208	92	51
Total other operating costs and expenses	187	209	560	318	198
Gain on sale of phosphate business	—	—	—	—	750
Equity in earnings (losses) of operating affiliates	36	9	(145)	(35)	43
Operating earnings	766	234	138	1,203	2,385
Interest expense—net	228	303	195	131	177
Loss on debt extinguishment	—	53	167	—	—
Other non-operating—net	(9)	3	2	14	21
Earnings (loss) before income taxes and equity in earnings of non-operating affiliates	547	(125)	(226)	1,058	2,187
Income tax provision (benefit)	119	(575)	(68)	396	773
Equity in earnings of non-operating affiliates—net of taxes	—	—	—	72	23
Net earnings (loss)	428	450	(158)	734	1,437
Less: Net earnings attributable to noncontrolling interests	138	92	119	34	47
Net earnings (loss) attributable to common stockholders	$290	$358	$(277)	$ 700	$ 1,390
Cash dividends declared per common share	$1.20	$1.20	$1.20	$ 1.20	$ 1.00
Share and per share data:					
Net earnings (loss) per share attributable to common stockholders:					
Basic	$1.25	$1.53	$(1.19)	$ 2.97	$ 5.43
Diluted	1.24	1.53	(1.19)	2.96	5.42
Weighted-average common shares outstanding:					
Basic	232.6	233.5	233.1	235.3	255.9
Diluted	233.8	233.9	233.1	236.1	256.7
Other Financial Data:					
Depreciation and amortization	$888	$883	$678	$ 480	$ 393
Capital expenditures	422	473	2,211	2,469	1,809

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CF INDUSTRIES HOLDINGS, INC.

	December 31,				
	2018	2017	2016	2015[2]	2014
	(in millions)				
Balance Sheet Data:					
Cash and cash equivalents	$682	$ 835	$1,164	$ 286	$1,997
Total assets	12,661	13,463	15,131	12,683	11,200
Customer advances	149	89	42	162	325
Total debt	4,698	4,692	5,778	5,537	4,538
Total equity	5,731	6,684	6,492	4,387	4,572

(1) As a result of our adoption of Accounting Standards Update (ASU) No. 2017-07, Compensation—Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost on January 1, 2018, cost of sales, selling, general and administrative expenses and other non-operating—net were adjusted for the years ended December 31, 2017, 2016, 2015 and 2014 and other operating—net was adjusted for the year ended December 31, 2014. See Note 3—New Accounting Standards for additional information.

(2) On July 31, 2015, we acquired the remaining 50% equity interest in CF Fertilisers UK not previously owned by us. CF Fertilisers UK is now wholly owned by us. The financial results of CF Fertilisers UK have been consolidated within our financial results since July 31, 2015. Prior to July 31, 2015, our initial 50% equity interest in CF Fertilisers UK was accounted for as an equity method investment and the financial results of this investment were included in equity in earnings of non-operating affiliates—net of taxes.

(3) On March 17, 2014, we completed the sale of our phosphate mining and manufacturing business. The selected historical financial data includes the results of the phosphate business through March 17, 2014, plus the continuing sales of the phosphate inventory in the distribution network after March 17, 2014. The remaining phosphate inventory was sold in the second quarter of 2014. The results of the phosphate mining and manufacturing business are not reported as discontinued operations in our consolidated statements of operations.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS.

You should read the following discussion and analysis in conjunction with the consolidated financial statements and related notes included in Item 8. Financial Statements and Supplementary Data. All references to "CF Holdings," "we," "us," "our" and "the Company" refer to CF Industries Holdings, Inc. and its subsidiaries, except where the context makes clear that the reference is only to CF Industries Holdings, Inc. itself and not its subsidiaries. All references to "CF Industries" refer to CF Industries, Inc., a 100% owned subsidiary of CF Industries Holdings, Inc. References to tons refer to short-tons. Notes referenced in this discussion and analysis refer to the notes to consolidated financial statements that are found in Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements. The following is an outline of the discussion and analysis included herein:

- Overview of CF Holdings
- Our Company
- Industry Factors
- Items Affecting Comparability of Results
- Financial Executive Summary
- Results of Consolidated Operations
  - Year Ended December 31, 2018 Compared to Year Ended December 31, 2017
  - Year Ended December 31, 2017 Compared to Year Ended December 31, 2016
- Operating Results by Business Segment
- Liquidity and Capital Resources
- Off-Balance Sheet Arrangements
- Critical Accounting Policies and Estimates
- Recent Accounting Pronouncements

Overview of CF Holdings

Our Company

We are a leading global fertilizer and chemical company. Our 3,000 employees operate world-class manufacturing complexes in Canada, the United Kingdom and the United States. Our principal customers are cooperatives, independent fertilizer distributors, traders, wholesalers, farmers and industrial users. Our principal nitrogen fertilizer products are ammonia, granular urea, urea ammonium nitrate solution (UAN) and ammonium nitrate (AN). Our other nitrogen products include diesel exhaust fluid (DEF), urea liquor, nitric acid and aqua ammonia, which are sold primarily to our industrial customers, and compound fertilizer products (NPKs), which are solid granular fertilizer products for which the nutrient content is a combination of nitrogen, phosphorus and potassium. We serve our customers in North America through our production, storage, transportation and distribution network. We also reach a global customer base with exports from our Donaldsonville, Louisiana, plant, the world's largest and most flexible nitrogen complex. Additionally, we move product to international destinations from our Verdigris, Oklahoma, facility, our Yazoo City, Mississippi, facility, and our Billingham and Ince facilities in the United Kingdom, and a joint venture ammonia facility in the Republic of Trinidad and Tobago in which we own a 50 percent interest.

Our principal assets include:

- five U.S. nitrogen fertilizer manufacturing facilities, located in Donaldsonville, Louisiana (the largest nitrogen fertilizer complex in the world); Port Neal, Iowa; Yazoo City, Mississippi; Verdigris, Oklahoma; and Woodward, Oklahoma. These facilities are owned directly or indirectly by CF Industries Nitrogen, LLC (CFN), of which we own approximately 89% and CHS Inc. (CHS) owns the remainder. See Note 17—Noncontrolling Interests for additional information on our strategic venture with CHS;
- two Canadian nitrogen fertilizer manufacturing facilities, located in Medicine Hat, Alberta (the largest nitrogen fertilizer complex in Canada) and Courtright, Ontario;

- two United Kingdom nitrogen manufacturing facilities, located in Billingham and Ince;

- an extensive system of terminals and associated transportation equipment located primarily in the Midwestern United States; and
- a 50% interest in Point Lisas Nitrogen Limited (PLNL), an ammonia production joint venture located in the Republic of Trinidad and Tobago that we account for under the equity method.

Our nitrogen fertilizer manufacturing facility in Verdigris, Oklahoma, is owned and operated by Terra Nitrogen, Limited Partnership (TNLP). Prior to April 2, 2018, TNLP was a subsidiary of Terra Nitrogen Company, L.P. (TNCLP), which was a publicly traded limited partnership of which we were the sole general partner and the majority limited partner, and in which we owned an approximate 75.3% interest.

On February 7, 2018, we announced that, in accordance with the terms of TNCLP's First Amended and Restated Agreement of Limited Partnership (as amended by Amendment No. 1 to the First Amended and Restated Agreement of Limited Partnership, the TNCLP Agreement of Limited Partnership), Terra Nitrogen GP Inc. (TNGP), the sole general partner of TNCLP and an indirect wholly owned subsidiary of CF Holdings, elected to exercise its right to purchase all of the 4,612,562 publicly traded common units of TNCLP (the TNCLP Public Units). TNGP completed its purchase of the TNCLP Public Units on April 2, 2018 (the Purchase) for an aggregate cash purchase price of $388 million. We funded the Purchase with cash on hand. Upon completion of the Purchase, CF Holdings owned, through its subsidiaries, 100 percent of the general and limited partnership interests of TNCLP.

Industry Factors

We operate in a highly competitive, global industry. Our operating results are influenced by a broad range of factors, including those outlined below.

Global Supply and Demand Factors

Our products are globally traded commodities and are subject to price competition. The customers for our products make their purchasing decisions principally on the basis of delivered price and, to a lesser extent, on customer service and product quality. The selling prices of our products fluctuate in response to global market conditions, changes in supply and demand and different cost factors.

Historically, global fertilizer demand has been driven primarily by population growth, gross domestic product growth, changes in dietary habits, planted acreage, and application rates, among other things. We expect these key variables to continue to have major impacts on long-term fertilizer demand for the foreseeable future. Short-term fertilizer demand growth may depend on global economic conditions, farm sector income, weather patterns, the level of global grain stocks relative to consumption, fertilizer application rates, and governmental regulations, including fertilizer subsidies or requirements mandating increased use of bio-fuels or industrial nitrogen products. Other geopolitical factors like temporary disruptions in fertilizer trade related to government intervention or changes in the buying/selling patterns of key exporting/consuming countries such as China, India, Russia and Brazil, among others, often play a major role in shaping near-term market fundamentals. The economics of nitrogen-based fertilizer manufacturing play a key role in decisions to increase or reduce production capacity. Supply of fertilizers is generally driven by available capacity and operating rates, raw material costs and availability, government policies and global trade. Raw materials are dependent on energy sources such as natural gas or coal; therefore, supply costs are affected by the supply of and demand for these commodities.

Strong demand, high capacity utilization and increasing operating margins as a result of higher global nitrogen fertilizer prices stimulated global investment in nitrogen production facilities, which resulted in an increase in global nitrogen fertilizer production capacity. At times, global nitrogen fertilizer capacity increased faster than global nitrogen fertilizer demand, creating a surplus of global nitrogen capacity in the market, and leading to lower nitrogen fertilizer selling prices.

Global Trade in Fertilizer

In addition to the relationship between global supply and demand, profitability within a particular geographic region is determined by the supply/demand balance within that region. Regional supply and demand can be influenced significantly by factors affecting trade within regions. Some of these factors include the relative cost to produce and deliver product, relative currency values, the availability of credit and governmental trade policies, including the imposition of duties, tariffs or quotas, that affect foreign trade or investment. The development of additional natural gas reserves in North America over the last decade has decreased natural gas costs relative to the rest of the world, making North American nitrogen fertilizer producers more competitive. These lower natural gas costs contributed to announcements of several nitrogen fertilizer capacity expansion projects in North America, including our capacity expansion projects in Donaldsonville, Louisiana and Port Neal, Iowa, which were completed in December 2016. Changes in currency values may also alter our cost competitiveness relative to producers in other regions of the world.

Imports account for a significant portion of the nitrogen fertilizer consumed in North America. Producers of nitrogen-based fertilizers located in the Middle East, the Republic of Trinidad and Tobago, Venezuela, North Africa, Russia and China have been major exporters to North America in recent years.

Farmers' Economics

The demand for fertilizer is affected by the aggregate crop planting decisions and fertilizer application rate decisions of individual farmers. Individual farmers make planting decisions based largely on prospective profitability of a harvest, while the specific varieties and amounts of fertilizer they apply depend on factors like their current liquidity, soil conditions, weather patterns, crop prices, fertilizer products used and timing of applications, expected yields and the types of crops planted.

Items Affecting Comparability of Results

Nitrogen Fertilizer Selling Prices

The U.S. Gulf is a major global fertilizer pricing point due to the volume of nitrogen fertilizer that trades there. Through most of 2016, nitrogen pricing at the U.S. Gulf declined, often trading below parity with other international pricing points due to the combination of new global nitrogen production capacity that came on line in 2016, continued imports from various exporting regions and decreased North American buyer interest as a result of greater global nitrogen supply availability. Seasonal decreases in agricultural demand combined with delayed customer purchasing activity resulted in multi-year lows in nitrogen fertilizer selling prices in the second half of 2016. In 2017, the significant price fluctuations we experienced continued and were symptoms of a market in transition as new capacity came on line and global trade flows began to adjust.

In 2018, higher energy costs in Asia and Europe, along with continued enforcement of environmental regulations in China, resulted in lower nitrogen production in these regions. In addition, outages impacted the nitrogen supply and demand balance. These factors collectively drove global nitrogen prices higher throughout 2018.

The average selling price for our products for 2018, 2017 and 2016 was $229 per ton, $207 per ton and $217 per ton, respectively. The increase in average selling prices of 11% in 2018 from 2017 increased net sales by $520 million. The decline in average selling prices in 2017 from 2016 reduced net sales by $293 million.

Sales Volume

In the first quarter of 2018, drought conditions in the Southern Plains along with wet and cold temperatures throughout much of the Midwestern United States and the United Kingdom delayed the spring application season and impacted sales volume. This delay in the spring application season resulted in high inventory levels both entering and through much of the second quarter as volume typically shipped in the first quarter was instead shipped in the second quarter of 2018. After the delayed spring application season, through the first nine months of 2018, sales volume for our products was essentially unchanged compared to the first nine months of 2017. In the fourth quarter of 2018, our sales volume declined 11% compared to the prior year fourth quarter, due primarily to the impact of unfavorable weather conditions in the Northern Plains and the Midwestern United States, which limited fall fertilizer applications of ammonia and the impact of lower ammonia and AN production due to plant turnaround and maintenance activity.

Sales volume for our products in 2018, 2017 and 2016 is shown in the table below.

	2018		2017		2016	
	Sales Volume (tons)	Net Sales	Sales Volume (tons)	Net Sales	Sales Volume (tons)	Net Sales
	(tons in thousands; dollars in millions)					
Ammonia	3,135	$1,028	4,105	$1,209	2,874	$981
Granular urea	4,898	1,322	4,357	971	3,597	831

UAN	7,042	1,234	7,093	1,134	6,681	1,196
AN	2,002	460	2,353	497	2,151	411
Other	2,252	385	2,044	319	1,654	266
Total	19,329	$4,429	19,952	$4,130	16,957	$3,685

The decrease in sales volume in 2018 from 2017 was due primarily to the impact in the fourth quarter of 2018 of unfavorable weather conditions in the Northern Plains and the Midwestern United States. In addition, the volume decline reflects lower ammonia and AN production, primarily in the fourth quarter of 2018, as a result of plant turnaround and maintenance activity. The decline in sales volume decreased net sales by $221 million in 2018. The increase in total sales volume in 2017 from 2016 was due primarily to higher ammonia and granular urea sales volumes, driven by increased production from the completion of our capacity expansion projects in December 2016. This increase in sales volume increased net sales by $738 million in 2017.

Other Items Affecting Comparability of Results

During the years ended December 31, 2018, 2017 and 2016, certain significant items impacted our financial results. The following table and related discussion outline these significant items and how they impacted the comparability of our financial results during these periods. Positive amounts in the table below are costs or expenses incurred, while negative amounts are income recognized in the periods presented.

	2018		2017		2016	
	Pre-Tax	After-Tax[1]	Pre-Tax	After-Tax[1]	Pre-Tax	After-Tax[1]
	(in millions)					
Unrealized net mark-to-market (gain) loss on natural gas derivatives[2]	$(13)	$ (10)	$61	$ 39	$(260)	$ (163)
(Gain) loss on foreign currency transactions including intercompany loans[3]	(5)	(4)	2	1	93	93
Insurance proceeds[3]	(10)	(8)	—	—	—	—
Costs related to the acquisition of TNCLP Public Units[4]	2	1	—	—	—	—
Earnings attributable to noncontrolling interests - TNCLP[5]	8	8	19	19	26	26
Equity method investments:						
PLNL settlement income[6]	(19)	(19)	—	—	—	—
Equity method investment tax contingency accrual[6]	—	—	7	7	—	—
Gain on sale of equity method investment[6]	—	—	(14)	(9)	—	—
Impairment of equity method investment in PLNL[6]	—	—	—	—	134	134
Loss on embedded derivative liability[3]	—	—	4	3	23	14
Impact of U.S. Tax Cuts and Jobs Act[7]	—	16	—	(491)	—	—
Debt activity:						
Loss on debt extinguishment	—	—	53	33	167	105
Debt and revolver amendment fees[8]	—	—	—	—	18	11
Capacity expansion project expenses[3]	—	—	—	—	73	46
Start-up costs - Donaldsonville / Port Neal expansion plants[2]	—	—	—	—	52	32
Transaction costs and termination of agreement with OCI:						
Transaction costs	—	—	—	—	179	96
Financing costs related to bridge loan commitment fee[9]	—	—	—	—	28	18
Total Impact of Significant Items	$(37)	$ (16)	$132	$ (398)	$533	$ 412

(1) The tax impact is calculated utilizing a marginal effective rate of 22.9% in 2018, 36.8% in 2017 and 37.2% in 2016.
(2) Included in cost of sales in our consolidated statements of operations.
(3) Included in other operating—net in our consolidated statements of operations.
(4) Included in selling, general and administrative expenses in our consolidated statement of operations.
(5) Included in net earnings attributable to noncontrolling interests in our consolidated statements of operations.

(6) Included in equity in earnings (loss) of operating affiliates in our consolidated statements of operations.
(7) Included in income tax provision (benefit) in our consolidated statements of operations.
(8) Included primarily in interest expense in our consolidated statements of operations.
(9) Included in interest expense in our consolidated statements of operations.

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CF INDUSTRIES HOLDINGS, INC.

The following describes the significant items that impacted the comparability of our financial results in 2018, 2017 and 2016. Descriptions of items below that refer to amounts in the table above, refer to the pre-tax amounts, except for the discussion under Tax Cuts and Jobs Act.

Unrealized net mark-to-market (gain) loss on natural gas derivatives

Natural gas is typically the largest and most volatile single component of the manufacturing cost for nitrogen-based products. We manage the risk of changes in natural gas prices through the use of derivative financial instruments. The derivatives that we may use for this purpose are primarily natural gas fixed price swaps, natural gas basis swaps and natural gas options. We use natural gas derivatives as an economic hedge of natural gas price risk, but without the application of hedge accounting. This can result in volatility in reported earnings due to the unrealized mark-to-market adjustments that occur from changes in the value of the derivatives, which is reflected in cost of sales in our consolidated statements of operations. In 2018, 2017 and 2016, we recognized unrealized net mark-to-market (gains) losses on natural gas derivatives of $(13) million, $61 million and $(260) million, respectively.

(Gain) loss on foreign currency transactions including intercompany loans

In 2018, 2017 and 2016, we recognized (gains) losses of $(5) million, $2 million and $93 million, respectively, from the impact of changes in foreign currency exchange rates on primarily British pound and Canadian dollar denominated intercompany loans that were not permanently invested.

Insurance proceeds

In 2018, we recognized income of $10 million related to a property insurance claim at one of our nitrogen complexes. These proceeds are reflected in other operating—net in our consolidated statement of operations.

Acquisition of the TNCLP Public Units

In 2018, we incurred $2 million of costs for various legal services associated with the acquisition of the publicly traded common units of TNCLP. These costs are reflected in selling, general and administrative expenses in our consolidated statement of operations.

Beginning in the second quarter of 2018, as a result of the April 2, 2018 acquisition of the TNCLP Public Units, there are no longer earnings attributable to noncontrolling interests in TNCLP. In 2018, 2017 and 2016, earnings attributable to noncontrolling interests in TNCLP was $8 million, $19 million and $26 million, respectively.

Equity method investments

- Our joint venture in the Republic of Trinidad and Tobago, PLNL, operates an ammonia plant that relies on natural gas supplied, under a Gas Sales Contract (the NGC Contract), by The National Gas Company of Trinidad and Tobago Limited (NGC). PLNL experienced past curtailments in the supply of natural gas, which reduced historical ammonia production at PLNL. The NGC Contract had an initial expiration date of September 2018 and was extended on the same terms until September 2023. Any NGC commitment to supply gas beyond 2023 will be based on new agreements. In May 2018, the NGC and PLNL reached a settlement of an arbitration proceeding regarding PLNL's claims for damages due to natural gas supply curtailments. The net after-tax impact of the settlement reached between NGC and PLNL that is recognized in our consolidated statement of operations for 2018 was an increase in our equity in earnings of operating affiliates of approximately $19 million.
- The Trinidad tax authority (the Board of Inland Revenue) issued a tax assessment against PLNL related to a dispute over whether tax depreciation must be claimed during a tax holiday period that was granted to PLNL under the Trinidad Fiscal Incentives Act. The tax holiday was granted as an incentive to construct PLNL's ammonia plant. Based on the facts and circumstances of this matter, PLNL recorded a tax contingency accrual, which reduced our equity in earnings of PLNL for 2017 by approximately $7 million reflecting our 50% ownership interest. In early 2018, PLNL settled this matter with the Board of Inland Revenue for the amounts accrued.
- In the fourth quarter of 2017, we recognized a gain of $14 million related to the sale of our interest in a joint venture that owned a carbon dioxide liquefaction and purification facility.
-

In 2016, our equity in earnings (loss) of operating affiliates includes an impairment charge of our equity method investment in PLNL of $134 million. See “Critical Accounting Policies and Estimates” below, for additional information.

See Note 8—Equity Method Investments for additional information regarding our equity method investments.

Loss on embedded derivative liability

Under the terms of our strategic venture with CHS, if our credit rating as determined by two of three specified credit rating agencies is below certain levels, we are required to make a non-refundable yearly payment of $5 million to CHS. Since our credit ratings were below certain levels in 2016, 2017 and 2018, we made a payment of $5 million to CHS in each year. These payments will continue on a yearly basis until the earlier of the date that our credit rating is upgraded to or above certain levels by two of three specified credit rating agencies or February 1, 2026. This obligation is recognized on our consolidated balance sheets as an embedded derivative. Included in other operating—net in our consolidated statements of operations in 2017 and 2016 is a net loss of $4 million and $23 million, respectively. The impact to our consolidated statement of operations in 2018 is immaterial.

Tax Cuts and Jobs Act

On December 22, 2017, the U.S. government enacted the Tax Cuts and Jobs Act (the "Tax Act" or "Tax Reform") which includes a number of changes to U.S. tax law that affect us. As a result of the Tax Act we recognized a $491 million income tax benefit in 2017, and an income tax charge of $16 million in 2018. These impacts generally resulted from the following items:

- Impact of Tax Rate Change on Deferred Tax Liabilities - The most significant impact of Tax Reform was the reduction of the U.S. statutory corporate tax rate from 35% to 21%. This change necessitated the revaluation of all of our U.S. deferred tax balances, which resulted in an income tax benefit of $552 million that was recorded in 2017.
- Transition Tax (Repatriation Tax) on Foreign Earnings and Profits - Tax Reform required us to pay U.S. tax on our previously untaxed foreign earnings. Foreign earnings held in the form of cash and cash equivalents are taxed at a 15.5% rate, and the remaining earnings are taxed at an 8% rate. We have elected to pay the transition tax in installments over an eight-year period. As a result, we recognized a provisional charge and liability of $57 million in 2017. During 2018, we recorded an additional $16 million to increase the provisional amount recorded in 2017.

Debt activity

On December 1, 2017, we redeemed all of the $800 million outstanding principal amount of the 6.875% senior notes due May 2018 (the 2018 Notes) in accordance with the optional redemption provisions provided in the indenture governing the 2018 Notes. The total aggregate redemption price was approximately $817 million. On December 26, 2017, we purchased approximately $300 million aggregate principal amount of the $800 million outstanding principal amount of the 7.125% senior notes due 2020 (the 2020 Notes) at a total purchase price of approximately $331 million. As a result of the early redemption of the 2018 Notes and the purchase of the 2020 Notes, we recognized a loss on debt extinguishment of $53 million in 2017, primarily consisting of $48 million of total premiums paid for the early retirement of debt for the 2018 Notes and 2020 Notes.

On November 21, 2016, we prepaid the $1.0 billion aggregate principal amount of the senior notes due 2022, 2025 and 2027 (the Private Senior Notes), and paid the related make-whole amount of approximately $170 million. We made the prepayment and make-whole payment using the proceeds from an offering of $1.25 billion aggregate principal amount of senior secured notes consisting of $500 million aggregate principal amount of senior secured notes due 2021 and $750 million aggregate principal amount of senior secured notes due 2026 (collectively referred to as the "Senior Secured Notes"). We recognized $167 million of the $170 million cash make-whole payment on the Private Senior Notes as a loss on debt extinguishment in 2016, with the $3 million remainder being a debt modification cost that is being amortized over the term of the Senior Secured Notes.

In connection with the completion of the offering of the Senior Secured Notes and the prepayment of the Private Senior Notes in November 2016, certain amendments to the Revolving Credit Agreement became effective. The amendments included, among other things, changes in and additions to the financial and other covenants and a reduction in the size of the facility from $1.5 billion to $750 million.

In 2016, in conjunction with our debt restructuring, including amendments to the Revolving Credit Agreement in July and November 2016, we recognized $18 million of debt issuance and amendment fees.

See further discussion below under “Liquidity and Capital Resources” for additional information.

Capacity expansion projects

Our capacity expansion projects were completed in the fourth quarter of 2016. Capacity expansion project expenses of $73 million are included in other operating—net in our consolidated statement of operations for the year ended December 31, 2016, and generally consisted of administrative costs and other project costs that did not qualify for capitalization.

Start-up costs of $52 million, which primarily related to the cost of commencing production at the ammonia plants, were incurred in 2016 and are included in cost of sales in our consolidated statement of operations for the year ended December 31, 2016.

Transaction costs and termination of agreement with OCI

On August 6, 2015, we entered into a definitive agreement (as amended, the Combination Agreement) to combine with the European, North American and global distribution businesses of OCI N.V. (OCI). On May 22, 2016, CF Holdings, OCI and the other parties to the Combination Agreement entered into a termination agreement (the Termination Agreement) under which the parties agreed to terminate the Combination Agreement by mutual written consent. Pursuant to the Termination Agreement, CF Holdings paid OCI a termination fee of $150 million. Under the Termination Agreement, the parties to the Combination Agreement also agreed to release each other from any and all claims, actions, obligations, liabilities, expenses and fees in connection with, arising out of or related to the Combination Agreement and all ancillary agreements contemplated thereby (other than the confidentiality agreement between CF Holdings and OCI) or the transactions contemplated therein or thereby.

In 2016, we incurred $179 million of transaction costs associated with the proposed combination with certain businesses of OCI and our strategic venture with CHS. This includes the $150 million termination fee paid to OCI in the second quarter of 2016, which is described above, and costs for various consulting and legal services.

On September 18, 2015, in connection with our proposed combination with OCI, we entered into a senior unsecured 364-day Bridge Credit Agreement (as amended, the Bridge Credit Agreement). Upon the termination of the Combination Agreement on May 22, 2016, the lenders' commitment under the Bridge Credit Agreement terminated automatically and we recognized $28 million in bridge loan commitment fees.

Financial Executive Summary

We reported net earnings attributable to common stockholders of $290 million in 2018 compared to $358 million in 2017, or a decrease in net earnings between the periods of $68 million, as 2017 included the benefit of Tax Reform. Diluted net earnings per share attributable to common stockholders was $1.24 in 2018 compared to $1.53 in 2017, or a decrease of $0.29 per share.

Our income tax provision for 2018 was $119 million compared to an income tax benefit of $575 million in 2017, a change of $694 million, primarily driven by the impact of Tax Reform, which was recognized in 2017. We recognized a $491 million tax benefit in 2017 related to the enactment of Tax Reform in the United States, which added $2.10 to diluted earnings per share. Further information regarding the impact of Tax Reform can be found above under "Items Affecting Comparability of Results—Tax Cuts and Jobs Act." The remaining increase in our income tax provision of $203 million was due primarily to pre-tax income in 2018 compared to a pre-tax loss in 2017.

Our total gross margin increased by $483 million, or 111%, in 2018 to $917 million as compared to $434 million in 2017. The increase in gross margin was due primarily to:

- an 11% increase in average selling prices, which increased gross margin by $520 million, driven by the tightening supply and demand conditions in the global nitrogen market, which are more fully described in the section above titled "Items Affecting Comparability of Results,"
- the impact of a $13 million unrealized net mark-to-market gain in 2018 compared to a $61 million loss in 2017, which increased gross margin by $74 million,
- a decrease in physical natural gas costs in 2018, including the impact of natural gas derivatives that settled in the period, which increased gross margin by $57 million,
- partially offset by the impact of lower sales volume, which decreased gross margin by $26 million, and higher costs of $142 million primarily associated with plant turnaround and maintenance activity, and other plant outages, in 2018.

Net interest expense declined by $75 million to $228 million in 2018 compared to $303 million in 2017. The decline is due to our redemption in December 2017 of all of the 2018 Notes and our December 2017 purchase of approximately $300 million aggregate principal amount of the $800 million outstanding principal amount of the 2020 Notes. As a result, we recognized a loss on debt extinguishment of $53 million in 2017, primarily consisting of $48 million of total premiums paid for the early retirement of debt for the 2018 Notes and 2020 Notes.

In August 2018, our Board of Directors authorized the repurchase of up to $500 million of CF Holdings common stock through June 30, 2020 (the 2018 Share Repurchase Program). In 2018, we completed the 2018 Share Repurchase Program with the repurchase of 10.9 million shares for $500 million, of which $33 million was accrued and unpaid as of December 31, 2018.

Results of Consolidated Operations

The following table presents our consolidated results of operations and supplemental data:

	Year ended December 31,						
	2018	2017	2016	2018 v. 2017		2017 v. 2016	
	(in millions, except as noted)						
Net sales	$4,429	$4,130	$3,685	$299	7 %	$445	12 %
Cost of sales (COS)[1]	3,512	3,696	2,842	(184)	(5)%	854	30 %
Gross margin	917	434	843	483	111 %	(409)	(49)%
Gross margin percentage	20.7 %	10.5 %	22.9 %	10.2 %		(12.4)%	
Selling, general and administrative expenses[1]	214	191	173	23	12 %	18	10 %
Transaction costs	—	—	179	—	— %	(179)	(100)%
Other operating—net	(27)	18	208	(45)	N/M	(190)	(91)%
Total other operating costs and expenses	187	209	560	(22)	(11)%	(351)	(63)%
Equity in earnings (loss) of operating affiliates	36	9	(145)	27	N/M	154	N/M
Operating earnings	766	234	138	532	N/M	96	70 %
Interest expense—net	228	303	195	(75)	(25)%	108	55 %
Loss on debt extinguishment	—	53	167	(53)	(100)%	(114)	(68)%
Other non-operating—net[1]	(9)	3	2	(12)	N/M	1	50 %
Earnings (loss) before income taxes	547	(125)	(226)	672	N/M	101	45 %
Income tax provision (benefit)	119	(575)	(68)	694	N/M	(507)	N/M
Net earnings (loss)	428	450	(158)	(22)	(5)%	608	N/M
Less: Net earnings attributable to noncontrolling interests	138	92	119	46	50 %	(27)	(23)%
Net earnings (loss) attributable to common stockholders	$290	$358	$(277)	$(68)	(19)%	$635	N/M
Diluted net earnings (loss) per share attributable to common stockholders	$1.24	$1.53	$(1.19)	$(0.29)	(19)%	$2.72	N/M
Diluted weighted-average common shares outstanding	233.8	233.9	233.1	(0.1)	— %	0.8	— %
Dividends declared per common share	$1.20	$1.20	$1.20	$—	— %	$—	— %
Natural gas supplemental data (per MMBtu)							
Natural gas costs in COS[2]	$3.15	$3.33	$2.61	$(0.18)	(5)%	$0.72	28 %
Realized derivatives loss in COS[3]	0.01	0.07	0.46	(0.06)	(86)%	(0.39)	(85)%
Cost of natural gas in COS	$3.16	$3.40	$3.07	$(0.24)	(7)%	$0.33	11 %
Average daily market price of natural gas Henry Hub (Louisiana)	$3.12	$2.96	$2.48	$0.16	5 %	$0.48	19 %
Average daily market price of natural gas National Balancing Point (UK)	$8.07	$5.80	$4.66	$2.27	39 %	$1.14	25 %
Unrealized net mark-to-market (gain) loss on natural gas derivatives	$(13)	$61	$(260)	$(74)	N/M	$321	N/M
Depreciation and amortization	$888	$883	$678	$5	1 %	$205	30 %
Capital expenditures	$422	$473	$2,211	$(51)	(11)%	$(1,738)	(79)%
Sales volume by product tons (000s)	19,329	19,952	16,957	(623)	(3)%	2,995	18 %
Production volume by product tons (000s):							
Ammonia[4]	9,805	10,295	8,307	(490)	(5)%	1,988	24 %

Granular urea	4,837	4,451	3,368	386	9 %	1,083	32 %
UAN (32%)	6,903	6,914	6,698	(11)	— %	216	3 %
AN	1,731	2,127	1,845	(396)	(19)%	282	15 %

N/M—Not Meaningful

(1) On January 1, 2018, we adopted ASU No. 2017-07, Compensation - Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost. As a result, we reclassified certain amounts in our consolidated statements of operations in 2017 and 2016. See Note 3—New Accounting Standards for additional information.

(2) Includes the cost of natural gas and related transportation that is included in cost of sales during the period under the first-in, first-out inventory cost method.

(3) Includes realized gains and losses on natural gas derivatives settled during the period. Excludes unrealized mark-to-market gains and losses on natural gas derivatives.

(4) Gross ammonia production, including amounts subsequently upgraded on-site into granular urea, UAN, or AN.

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

Net Sales

Our net sales are derived primarily from the sale of nitrogen fertilizers and are determined by the quantities of fertilizers we sell and the selling prices we realize. The volumes, mix and selling prices we realize are determined to a great extent by a combination of global and regional supply and demand factors. Net sales also include shipping and handling costs that are billed to our customers. Sales incentives are reported as a reduction in net sales.

Our total net sales increased $299 million, or 7%, to $4.43 billion in 2018 compared to $4.13 billion in 2017 due to an 11% increase in average selling prices, which increased net sales by $520 million, partially offset by a 3% decrease in sales volume, which decreased net sales by $221 million.

Average selling prices were $229 per ton in 2018 compared to $207 per ton in 2017 as selling prices increased across all segments. During 2018, higher energy costs in Asia and Europe, along with continued enforcement of environmental regulations in China, resulted in lower nitrogen production, tightening supply and demand conditions. In addition, outages at several producers also impacted the nitrogen supply and demand balance. These factors collectively drove global nitrogen prices higher in 2018.

The decrease in total sales volume of 3% was due primarily to lower sales volume in our ammonia and AN segments, partially offset by higher sales volumes in our granular urea and Other segments.

Cost of Sales

Our cost of sales includes manufacturing costs, purchased product costs, and distribution costs. Manufacturing costs, the most significant element of cost of sales, consist primarily of raw materials, realized and unrealized gains and losses on natural gas derivative instruments, maintenance, direct labor, depreciation and other plant overhead expenses. Purchased product costs primarily include the cost to purchase nitrogen fertilizers to augment or replace production at our facilities. Distribution costs include the cost of freight required to transport finished products from our plants to our distribution facilities and storage costs incurred prior to final shipment to customers.

Our cost of sales decreased $184 million, or 5%, in 2018 from 2017. The decrease in our cost of sales was due primarily to a 3% decrease in sales volume, an unrealized net mark-to-market gain on natural gas derivatives in 2018 compared to a loss in 2017, and the impact of lower realized natural gas costs. These decreases were partially offset by higher costs related to plant turnaround and maintenance activity and other plant outages in 2018. The cost of sales per ton averaged $182 in 2018, a 2% decrease from $185 per ton in 2017. Cost of sales includes a $13 million unrealized net mark-to-market gain in 2018 compared to a $61 million unrealized net mark-to-market loss in 2017. Additionally, realized natural gas costs, including the impact of realized derivatives, decreased 7% to $3.16 per MMBtu in 2018 from $3.40 per MMBtu in 2017.

Selling, General and Administrative Expenses

Our selling, general and administrative expenses consist primarily of corporate office expenses such as salaries and other payroll-related costs for our executive, administrative, legal, financial and marketing functions, as well as certain taxes and insurance and other professional service fees, including those for corporate initiatives.

Selling, general and administrative expenses increased $23 million to $214 million in 2018 from $191 million in 2017. The increase was due primarily to higher employee costs, including higher incentive compensation as a result of improved operating results, costs associated with certain corporate initiatives, and costs for various legal services associated with the acquisition of the publicly traded common units of TNCLP.

Other Operating—Net

Other operating—net includes administrative costs that do not relate directly to our central operations and, in 2016, costs associated with our capacity expansion projects. Costs included in “other operating costs” can include foreign exchange gains and losses, unrealized gains and losses on foreign currency derivatives, costs associated with our closed facilities, amounts recorded for environmental remediation for other areas of our business, litigation expenses and gains and losses on the disposal of fixed assets.

Other operating—net was $27 million of income in 2018 compared to $18 million of expense in 2017. The income in 2018 was primarily due to the combination of changes in legal reserves, insurance proceeds of $10 million and a gain of $6 million from the recovery of certain precious metals used in the manufacturing process.

Equity in Earnings of Operating Affiliates

Equity in earnings of operating affiliates primarily consists of our 50% ownership interest in PLNL. We include our share of the net earnings from our equity method investment in PLNL as an element of earnings from operations because this investment provides additional production and is integrated with our other supply chain and sales activities. Our share of the net earnings includes the amortization of certain tangible and intangible assets identified as part of the application of purchase accounting at acquisition.

Equity in earnings of operating affiliates was $36 million in 2018 compared to $9 million in 2017. The increase in earnings was due primarily to improved operating results for PLNL primarily driven by higher ammonia selling prices. In addition, earnings in 2018 include approximately $19 million related to the net after-tax impact of a settlement reached between NGC and PLNL of an arbitration proceeding regarding PLNL's claims for damages due to historical natural gas supply curtailments. See above under "Items Affecting Comparability of Results—Equity method investments" for additional information. Earnings in 2017 includes a gain of $14 million related to the sale of our interest in a joint venture that owned a carbon dioxide liquefaction and purification facility.

Interest Expense—Net

Our interest expense—net includes the interest expense on our long-term debt, amortization of the related fees required to execute financing agreements and annual fees pursuant to our Revolving Credit Agreement. Capitalized interest relating to the construction of major capital projects reduces interest expense as the interest is capitalized and amortized over the estimated useful lives of the facility along with all other construction costs. Interest expense—net also includes interest income, which represents amounts earned on our cash, cash equivalents and investments.

Net interest expense decreased by $75 million to $228 million in 2018 from $303 million in 2017. The $75 million decrease was primarily due to our redemption in December 2017 of all of the $800 million outstanding principal amount of the 2018 Notes and our December 2017 purchase of approximately $300 million aggregate principal amount of the $800 million outstanding principal amount of the 2020 Notes.

Loss on Debt Extinguishment

Loss on debt extinguishment of $53 million in 2017 primarily consists of premiums paid for the early retirement of debt for the 2018 Notes and 2020 Notes.

Income Tax Provision (Benefit)

Our income tax provision for 2018 was $119 million on pre-tax income of $547 million, compared to an income tax benefit of $575 million on a pre-tax loss of $125 million in 2017. Our effective tax rate for 2018 is based on the U.S. federal tax rate of 21% as a result of the enactment of the Tax Act on December 22, 2017, as compared to the U.S. federal tax rate of 35% that was applicable in 2017. Our effective tax rate is impacted by earnings attributable to noncontrolling interests in CFN and, prior to April 2, 2018, TNCLP, as our consolidated income tax provision (benefit) does not include a tax provision on the earnings attributable to the noncontrolling interests. Our effective tax rate for 2018 of 21.7%, exclusive of the earnings attributable to the noncontrolling interests of $138 million, would be 29.1%.

Our effective tax rate for 2018 was impacted by a $16 million increase to the provisional amount recorded in 2017 for the transition tax liability as result of the enactment of the Tax Act.

The Tax Act also provided a new tax category, Global Intangible Low-Taxed Income (GILTI), for income from foreign operations that is subject to federal income tax beginning in our 2018 tax year. The tax effect for our GILTI reduced the deferred tax asset for the 2017 net operating loss carryover by $12 million.

On April 2, 2018, we acquired the TNCLP Public Units. Our effective tax rate in 2018 is impacted by a $16 million reduction to our deferred tax liability due to the change in our effective state income tax rate resulting from the implementation of legal entity structure changes related to the acquisition.

In 2017, due primarily to the $491 million income tax benefit from the Tax Act, we recognized a $575 million income tax benefit on a pre-tax loss of $125 million. Our effective tax rate in 2017, exclusive of the tax benefit from the Tax

Act and exclusive of the earnings attributable to the noncontrolling interests of $92 million from our pre-tax loss, results in an effective tax rate of 38.8%. See Note 17—Noncontrolling Interests for additional information.
Both 2018 and 2017 were impacted by additional discrete tax items. See Note 10—Income Taxes for additional information.

Net Earnings Attributable to Noncontrolling Interests

Net earnings attributable to noncontrolling interests includes the net earnings attributable to the approximately 11% CHS minority equity interest in CFN, a subsidiary of CF Holdings. Prior to April 2, 2018, net earnings attributable to noncontrolling interests also included the net earnings attributable to the 24.7% interest of the publicly held common units of TNCLP. Beginning in the second quarter of 2018, as a result of the April 2, 2018 acquisition of the TNCLP Public Units, there are no longer earnings attributable to noncontrolling interests in TNCLP.

Net earnings attributable to noncontrolling interests increased $46 million in 2018 compared to 2017 due primarily to higher earnings from CFN driven by higher average selling prices due to the impact of a tighter global nitrogen supply and demand balance, partially offset by the reduction in noncontrolling interests due to the April 2, 2018 purchase of the noncontrolling interests in TNCLP.

Diluted Net Earnings Per Share Attributable to Common Stockholders

Diluted net earnings per share attributable to common stockholders decreased $0.29 to $1.24 per share in 2018 from $1.53 per share in 2017. This decrease is due primarily to the impact of Tax Reform in 2017, partially offset in 2018 by higher gross margin primarily driven by higher selling prices due to the impact of a tighter global nitrogen supply and demand balance, the impact of higher unrealized net mark-to-market gains on natural gas derivatives, and lower realized natural gas costs.

Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

Net Sales

Our total net sales increased $445 million, or 12%, to $4.13 billion in 2017 compared to $3.69 billion in 2016 due to an 18% increase in sales volume, which increased net sales by $738 million, partially offset by a 5% decrease in average selling prices, which reduced net sales by $293 million.

Average selling prices were $207 per ton in 2017 compared to $217 per ton in 2016 due primarily to lower ammonia, UAN and granular urea average selling prices in 2017. Selling prices were negatively impacted by greater supply availability which continued to pressure selling prices globally. During the fourth quarter of 2017, certain announced nitrogen industry capacity additions that were expected to occur, were delayed, and certain maintenance outages all led to a favorable supply demand balance and contributed to a rise in nitrogen pricing.

The increase in total sales volume of 18% was due primarily to higher ammonia and granular urea sales volumes, driven by increased production from the completion of our capacity expansion projects in December 2016.

Cost of Sales

Our cost of sales increased $854 million, or 30%, from 2016 to 2017. The increase in cost of sales was primarily due to the impact of higher sales volume, higher unrealized net mark-to-market losses on natural gas derivatives and higher realized natural gas costs, including the impact of realized derivatives, in addition to higher depreciation expense related to the completion of our capacity expansion projects and placing those assets into service. These increases to cost of sales were partially offset by targeted cost reduction initiatives, production efficiencies due to increased volume in 2017 and the absence of start-up costs of the new ammonia plant at our Donaldsonville facility and the new ammonia and urea plants at our Port Neal facility that occurred in 2016. The cost of sales per ton averaged $185 in 2017, a 10% increase from $168 per ton in 2016. Cost of sales included a $61 million unrealized net mark-to-market loss in 2017 compared to a $260 million unrealized net mark-to-market gain in 2016. Additionally, realized natural gas costs, including the impact of realized derivatives, increased 11% from $3.07 per MMBtu in 2016 to $3.40 per MMBtu in 2017.

Selling, General and Administrative Expenses

Selling, general and administrative expenses increased $18 million to $191 million in 2017 from $173 million in 2016. The increase was due primarily to the combination of certain corporate office initiatives and higher incentive compensation due to improvements in operating performance.

Transaction Costs

Transaction costs consist of various consulting and legal services associated with the proposed combination with certain businesses of OCI that was terminated on May 22, 2016 and our strategic venture with CHS, which began on February 1, 2016.

In 2016, we incurred $179 million of transaction costs, including the $150 million termination fee paid to OCI in the second quarter of 2016 as a result of the termination of the Combination Agreement and costs for various consulting and legal services.

Other Operating—Net

Other operating—net was $18 million of expense in 2017 compared to $208 million of expense in 2016. The decreased expense was due primarily to a $93 million loss in 2016 from the impact of changes in foreign currency exchange rates on primarily British pound and Canadian dollar denominated intercompany loans that were not permanently invested. Due to a restructuring of certain intercompany loans, we did not incur the same level of foreign exchange rate impacts in 2017. The decreased expense was also due to expansion project expenses in 2016 of $73 million, generally consisting of administrative and other project costs that did not qualify for capitalization, and a $23 million charge representing the net fair value adjustments to an embedded derivative related to our strategic venture with CHS. See Note 9—Fair Value Measurements for additional information.

Equity in Earnings (Losses) of Operating Affiliates

Equity in earnings (losses) of operating affiliates was $9 million of earnings in 2017 compared to $145 million of losses in 2016. Earnings in 2017 included a gain of $14 million related to the sale of our interest in a joint venture that owned a carbon dioxide liquefaction and purification facility. In the fourth quarter of 2016, we recognized a $134 million impairment of our equity method investment in PLNL. For additional information regarding the impairment of our equity method investment in PLNL, see “Critical Accounting Policies and Estimates,” below, and Note 8—Equity Method Investments.

Interest Expense—Net

Net interest expense increased by $108 million to $303 million in 2017 from $195 million in 2016. The $108 million increase was due primarily to a decrease in the amount of interest capitalized due to the completion of our capacity expansion projects. In 2016, capitalized interest was $166 million compared to $2 million in 2017. Net interest expense in 2016 also included the amortization of capitalized bridge credit agreement fees of $28 million pertaining to the bridge loan for our proposed combination with certain businesses of OCI. Upon the termination of the proposed combination with OCI, the unamortized portion of these fees was expensed.

During 2016, due to the uncertain duration of the prevailing low nitrogen fertilizer selling price environment and in order to provide liquidity and covenant flexibility for the future, we modified the Revolving Credit Agreement by reducing its size from $2.0 billion to $750 million and modifying certain covenants and other terms. As a result of these changes, we recognized $16 million of debt amendment fees and accelerated amortization of loan fees in interest expense in 2016.

Loss on Debt Extinguishment

Loss on debt extinguishment of $53 million in 2017 primarily consisted of premiums paid for the early retirement of debt for the 2018 Notes and 2020 Notes. Loss on debt extinguishment of $167 million in 2016 consisted of the make-whole payment, which resulted from our November 21, 2016 prepayment of the $1.0 billion aggregate principal amount of Private Senior Notes. The loss on debt extinguishment of $167 million excluded $3 million (of the $170 million make-whole payment), which was accounted for as a modification and recognized on our consolidated balance sheet as deferred financing fees, a reduction of long-term debt, and is being amortized using the effective interest rate method over the term of the Senior Secured Notes.

Income Tax (Benefit) Provision

Our income tax benefit for 2017 was $575 million on a pre-tax loss of $125 million, compared to an income tax benefit of $68 million on a pre-tax loss of $226 million in the prior year. The higher income tax benefit in 2017 was due primarily to the impact of the Tax Act, which resulted in an income tax benefit of $491 million recorded in the fourth quarter of 2017, reflecting our best estimate of the impact of the Tax Act.

The primary impact of the Tax Act is the revaluation of all of our U.S. deferred tax balances, as result of the reduction of the U.S. statutory corporate tax rate from 35% to 21%, which resulted in an income tax benefit of $552 million that was recorded in 2017. This income tax benefit was partially offset by a tax charge and liability of $57 million, which represented our best estimate of the transition tax, or repatriation tax, on foreign earnings and profits, as described above under “Items Affecting Comparability—Tax Cuts and Jobs Act.”

In addition, in both years, our effective tax rate was impacted by earnings attributable to noncontrolling interests in CFN and TNCLP, as our consolidated income tax (benefit) provision does not include a tax provision on the earnings attributable to the noncontrolling interests. As a result, earnings attributable to the noncontrolling interests of $92 million and $119 million in 2017 and 2016, respectively, which are included in our pre-tax loss, impact the effective tax rate in both years. See Note 17—Noncontrolling Interests for additional information.

Due primarily to the $491 million income tax benefit from the Tax Act, we recognized a $575 million income tax benefit in 2017 on a pre-tax loss of $125 million. Our effective tax rate in 2017, exclusive of the tax benefit from the Tax Act and exclusive of the earnings attributable to the noncontrolling interests of $92 million from our pre-tax loss, resulted in an effective tax rate of 38.8%. Our effective tax rate in 2016, exclusive of the earnings attributable to the noncontrolling interests of $119 million from our pre-tax income, resulted in an effective tax rate of 19.6%.

In the fourth quarter of 2016, we determined the carrying value of our equity method investment in PLNL exceeded fair value and recognized an impairment of our equity method investment in PLNL of $134 million, which is included in the equity in earnings of operating affiliates. Our 2016 income tax provision does not include a tax benefit for the impairment of our equity method investment as it will not give rise to a tax deduction, which reduced our 2016 effective tax rate.

Both 2017 and 2016 were impacted by additional discrete tax items. See Note 10—Income Taxes for additional information.

Net Earnings Attributable to Noncontrolling Interests

Net earnings attributable to noncontrolling interests includes the net earnings attributable to the 24.7% interest of the publicly-held common units of TNCLP. Prior to our acquisition of the TNCLP Public Units on April 2, 2018, we owned approximately 75.3% of TNCLP and outside investors owned the remaining 24.7%. Net earnings attributable to noncontrolling interests also includes the net earnings attributable to the approximately 11% CHS minority equity interest in CFN, a subsidiary of CF Holdings.

Net earnings attributable to noncontrolling interests decreased $27 million in 2017 compared to 2016 due primarily to lower earnings from both CFN and TNCLP as both were impacted by lower average selling prices due to greater global nitrogen supply availability due to global capacity additions. The earnings of CFN were also impacted by higher natural gas prices and the impact of higher depreciation as a result of the completion of our capacity expansion projects and placing those assets into service.

Diluted Net Earnings (Loss) Per Share Attributable to Common Stockholders

Diluted net earnings (loss) per share attributable to common stockholders, including the impact of Tax Reform, increased $2.72 to earnings of $1.53 per share in 2017 from a loss of $1.19 per share in 2016. This increase was due primarily to the impact of Tax Reform partially offset by lower gross margin primarily driven by an increase in unrealized net mark-to-market losses on natural gas derivatives, the impact of lower selling prices due to greater global nitrogen supply availability, higher realized natural gas costs, including the impact of realized derivatives, and higher depreciation expense.

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CF INDUSTRIES HOLDINGS, INC.

Operating Results by Business Segment

Our reportable segment structure reflects how our chief operating decision maker, as defined in the accounting principles generally accepted in the United States (U.S. GAAP), assesses the performance of our reportable segments and makes decisions about resource allocation. These segments are differentiated by products. Our management uses gross margin to evaluate segment performance and allocate resources. Total other operating costs and expenses (consisting of selling, general and administrative expenses and other operating—net) and non-operating expenses (interest and income taxes), are centrally managed and are not included in the measurement of segment profitability reviewed by management.

The following table presents summary operating results by business segment:

	Ammonia(1)	Granular Urea(1)(2)	UAN(1)(2)	AN(2)	Other(2)	Consolidated
	(in millions, except percentages)					
Year ended December 31, 2018						
Net sales	$1,028	$1,322	$1,234	$460	$385	$ 4,429
Cost of sales	867	889	1,007	414	335	3,512
Gross margin	$161	$433	$227	$46	$50	$ 917
Gross margin percentage	15.7 %	32.8 %	18.4 %	10.0 %	13.0 %	20.7 %
Year ended December 31, 2017						
Net sales	$1,209	$971	$1,134	$497	$319	$ 4,130
Cost of sales	1,070	855	1,053	446	272	3,696
Gross margin	$139	$116	$81	$51	$47	$ 434
Gross margin percentage	11.5 %	11.9 %	7.1 %	10.3 %	14.7 %	10.5 %
Year ended December 31, 2016						
Net sales	$981	$831	$1,196	$411	$266	$ 3,685
Cost of sales	714	583	919	409	217	2,842
Gross margin	$267	$248	$277	$2	$49	$ 843
Gross margin percentage	27.2 %	29.8 %	23.2 %	0.5 %	18.4 %	22.9 %

(1) Cost of sales and gross margin for the ammonia, granular urea and UAN segments for the years ended December 31, 2017 and December 31, 2016 were adjusted to reflect the reclassification of $4 million and $3 million, respectively, of defined benefit plan costs to other operating—net. These adjustments were a result of our adoption of ASU No. 2017-07 on January 1, 2018. See Note 3—New Accounting Standards for additional information.

(2) The cost of ammonia that is upgraded into other products is transferred at cost into the upgraded product results.

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Ammonia Segment

Our ammonia segment produces anhydrous ammonia (ammonia), which is our most concentrated nitrogen fertilizer as it contains 82% nitrogen. The results of our ammonia segment consist of sales of ammonia to external customers. In addition, ammonia is the "basic" nitrogen product that we upgrade into other nitrogen products such as granular urea, UAN and AN. We produce ammonia at all of our nitrogen manufacturing complexes.

The following table presents summary operating data for our ammonia segment:

	Year ended December 31,						
	2018	2017	2016	2018 v. 2017		2017 v. 2016	
	(in millions, except as noted)						
Net sales	$1,028	$1,209	$981	$(181)	(15)%	$228	23 %
Cost of sales	867	1,070	714	(203)	(19)%	356	50 %
Gross margin	$161	$139	$267	$22	16 %	$(128)	(48)%
Gross margin percentage	15.7 %	11.5 %	27.2 %	4.2 %		(15.7)%	
Sales volume by product tons (000s)	3,135	4,105	2,874	(970)	(24)%	1,231	43 %
Sales volume by nutrient tons (000s)(1)	2,571	3,367	2,358	(796)	(24)%	1,009	43 %
Average selling price per product ton	$328	$295	$341	$33	11 %	$(46)	(13)%
Average selling price per nutrient ton(1)	$400	$359	$416	$41	11 %	$(57)	(14)%
Gross margin per product ton	$51	$34	$93	$17	50 %	$(59)	(63)%
Gross margin per nutrient ton(1)	$63	$41	$113	$22	54 %	$(72)	(64)%
Depreciation and amortization	$155	$183	$96	$(28)	(15)%	$87	91 %
Unrealized net mark-to-market (gain) loss on natural gas derivatives	$(4)	$20	$(85)	$(24)	N/M	$105	N/M

N/M—Not Meaningful

(1) Ammonia represents 82% nitrogen content. Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

Net Sales. Net sales in the ammonia segment decreased by $181 million, or 15%, to $1,028 million in 2018 from $1,209 million in 2017 due primarily to a 24% decrease in sales volume partially offset by an 11% increase in average selling prices. Sales volume was lower in 2018 due to unfavorable weather conditions in the fourth quarter and lower production volume in 2018 as a result of plant turnaround and maintenance activity, and other plant outages. Selling prices in 2018 increased as higher energy costs in Asia and Europe, along with continued enforcement of environmental regulations in China, resulted in lower production in these regions, tightening the global nitrogen supply and demand balance.

Cost of Sales. Cost of sales per ton in our ammonia segment averaged $277 per ton in 2018, a 6% increase from $261 per ton in 2017. The increase was due primarily to higher costs associated with plant turnaround and maintenance activity, and other plant outages, offset by lower natural gas costs and the impact of a $4 million unrealized net mark-to-market gain on natural gas derivatives in 2018 compared to a $20 million loss in 2017.

Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

Net Sales. Net sales in the ammonia segment increased by $228 million, or 23%, to $1,209 million in 2017 from $981 million in 2016 due primarily to a 43% increase in sales volume partially offset by a 13% decrease in average selling prices. The increase in sales volume was due to higher production from the completion of our capacity expansion projects in December 2016. Average selling prices declined due to greater global nitrogen supply availability due to global capacity additions. Selling prices strengthened in the fourth quarter of 2017 rising approximately 3% compared to the prior year period.

Cost of Sales. Cost of sales per ton in our ammonia segment averaged $261 per ton in 2017, a 5% increase from $248 per ton in 2016. The increase was due primarily to higher unrealized net mark-to-market losses on natural gas derivatives, higher realized natural gas costs, including the impact of realized derivatives, in addition to higher depreciation as a result of the new ammonia plants at our Donaldsonville and Port Neal facilities, partially offset by the start-up costs for those plants in 2016 and production efficiencies realized in 2017 due to increased volume. Depreciation and amortization in our ammonia segment in 2017 was $45 per ton compared to $33 per ton in 2016.

Granular Urea Segment

Our granular urea segment produces granular urea, which contains 46% nitrogen. Produced from ammonia and carbon dioxide, it has the highest nitrogen content of any of our solid nitrogen fertilizers. Granular urea is produced at our Courtright, Ontario; Donaldsonville, Louisiana; Medicine Hat, Alberta; and Port Neal, Iowa nitrogen complexes.

The following table presents summary operating data for our granular urea segment:

	Year ended December 31,						
	2018	2017	2016	2018 v. 2017		2017 v. 2016	
	(in millions, except as noted)						
Net sales	$1,322	$971	$831	$351	36 %	$140	17 %
Cost of sales	889	855	583	34	4 %	272	47 %
Gross margin	$433	$116	$248	$317	N/M	$(132)	(53)%
Gross margin percentage	32.8 %	11.9 %	29.8 %	20.9 %		(17.9)%	
Sales volume by product tons (000s)	4,898	4,357	3,597	541	12 %	760	21 %
Sales volume by nutrient tons (000s)[(1)]	2,253	2,004	1,654	249	12 %	350	21 %
Average selling price per product ton	$270	$223	$231	$47	21 %	$(8)	(3)%
Average selling price per nutrient ton[(1)]	$587	$485	$502	$102	21 %	$(17)	(3)%
Gross margin per product ton	$88	$27	$69	$61	N/M	$(42)	(61)%
Gross margin per nutrient ton[(1)]	$192	$58	$150	$134	N/M	$(92)	(61)%
Depreciation and amortization	$276	$246	$112	$30	12 %	$134	120 %
Unrealized net mark-to-market (gain) loss on natural gas derivatives	$(4)	$16	$(67)	$(20)	N/M	$83	N/M

N/M—Not Meaningful

(1) Granular urea represents 46% nitrogen content. Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

Net Sales. Net sales in the granular urea segment increased $351 million, or 36%, to $1,322 million in 2018 compared to $971 million in 2017 due primarily to a 21% increase in average selling prices and a 12% increase in sales volume. Average selling prices increased to $270 per ton in 2018 compared to $223 per ton in 2017 as higher energy costs in Asia and Europe, along with continued enforcement of environmental regulations in China, resulted in lower production in these regions, tightening the global nitrogen supply and demand balance. Sales volume was higher due primarily to higher supply availability from increased production at our Port Neal facility as a result of higher demand, and higher inventories entering the year.

Cost of Sales. Cost of sales per ton in our granular urea segment averaged $182 in 2018, a 7% decrease from the $196 per ton in 2017. The decrease was due primarily to lower realized natural gas costs and an unrealized net mark-to-market gain on natural gas derivatives in 2018 compared to a loss in 2017 and the impact of a 9% increase in production.

Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

Net Sales. Net sales in the granular urea segment increased by $140 million, or 17%, to $971 million in 2017 compared to $831 million in 2016 due primarily to a 21% increase in sales volume partially offset by a 3% decrease in average selling prices. Sales volume was higher due to increased production at our new Port Neal facility, which came on line in the fourth quarter of 2016. Average selling prices decreased to $223 per ton in 2017 compared to $231 per ton in 2016 due primarily to greater global nitrogen supply availability due to global capacity additions. Selling prices strengthened in the fourth quarter of 2017 rising approximately 14% compared to the prior year period.

Cost of Sales. Cost of sales per ton in our granular urea segment averaged $196 in 2017, a 21% increase from the $162 per ton in 2016. The increase was due primarily to higher depreciation as a result of the new granular urea plant at our Port Neal facility, an unrealized net mark-to-market loss on natural gas derivatives in 2017 compared to a gain in the comparable period of 2016 and higher realized natural gas costs, including the impact of realized derivatives. These increases in cost of sales were partially offset by the impact of production efficiencies due to increased volume. Depreciation and amortization in our granular urea segment in 2017 was $56 per ton compared to $31 per ton in 2016.

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UAN Segment

Our UAN segment produces urea ammonium nitrate solution (UAN). UAN, a liquid fertilizer product with a nitrogen content that typically ranges from 28% to 32%, is produced by combining urea and ammonium nitrate. UAN is produced at our nitrogen complexes in Courtright, Ontario; Donaldsonville, Louisiana; Port Neal, Iowa; Verdigris, Oklahoma; Woodward, Oklahoma; and Yazoo City, Mississippi.

The following table presents summary operating data for our UAN segment:

	Year ended December 31,						
	2018	2017	2016	2018 v. 2017		2017 v. 2016	
	(in millions, except as noted)						
Net sales	$1,234	$1,134	$1,196	$100	9 %	$(62)	(5)%
Cost of sales	1,007	1,053	919	(46)	(4)%	134	15 %
Gross margin	$227	$81	$277	$146	180 %	$(196)	(71)%
Gross margin percentage	18.4 %	7.1 %	23.2 %	11.3 %		(16.1)%	
Sales volume by product tons (000s)	7,042	7,093	6,681	(51)	(1)%	412	6 %
Sales volume by nutrient tons (000s)[1]	2,225	2,242	2,109	(17)	(1)%	133	6 %
Average selling price per product ton	$175	$160	$179	$15	9 %	$(19)	(11)%
Average selling price per nutrient ton[1]	$555	$506	$567	$49	10 %	$(61)	(11)%
Gross margin per product ton	$32	$11	$41	$21	191 %	$(30)	(73)%
Gross margin per nutrient ton[1]	$102	$36	$131	$66	183 %	$(95)	(73)%
Depreciation and amortization	$270	$265	$247	$5	2 %	$18	7 %
Unrealized net mark-to-market (gain) loss on natural gas derivatives	$(4)	$19	$(81)	$(23)	N/M	$100	N/M

N/M—Not Meaningful

(1) UAN represents between 28% and 32% of nitrogen content, depending on the concentration specified by the customer. Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

Net Sales. Net sales in the UAN segment increased $100 million, or 9%, to $1,234 million in 2018 due primarily to a 9% increase in average selling prices partially offset by a 1% decrease in sales volume. Average selling prices increased to $175 per ton in 2018 compared to $160 per ton in 2017, due primarily to the impact of a tighter global nitrogen supply and demand balance.

Cost of Sales. Cost of sales per ton in our UAN segment averaged $143 in 2018, a 4% decrease from $149 per ton in 2017. The decrease was due primarily to lower realized natural gas costs and the impact of a $4 million unrealized net mark-to-market gain on natural gas derivatives in 2018 compared to a $19 million loss in 2017.

Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

Net Sales. Net sales in the UAN segment decreased $62 million, or 5%, to $1,134 million in 2017 due primarily to an 11% decrease in average selling prices partially offset by a 6% increase in sales volume. Average selling prices decreased to $160 per ton in 2017 compared to $179 per ton in 2016. UAN average selling prices were lower due primarily to greater global nitrogen supply availability due to global capacity additions. Selling prices strengthened in the fourth quarter of 2017 rising approximately 1% compared to the prior year period. Our sales volume was higher due primarily to growth in our North American customer base and higher export sales.

Cost of Sales. Cost of sales per ton in our UAN segment averaged $149 in 2017, an 8% increase from the average of $138 per ton in 2016. The increase was due primarily to the impact of an unrealized net mark-to-market loss on natural gas derivatives in 2017 compared to a gain in 2016 and the impact of higher realized natural gas costs in 2017, including the impact of realized derivatives, partially offset by targeted cost reduction initiatives and production efficiencies due to increased volume. Depreciation and amortization in our UAN segment in both 2017 and 2016 was $37 per ton.

AN Segment

Our AN segment produces ammonium nitrate (AN). AN is a nitrogen-based product with a nitrogen content between 29% and 35%. AN is used as nitrogen fertilizer and is also used by industrial customers for commercial explosives and blasting systems. AN is produced at our nitrogen complexes in Yazoo City, Mississippi and Ince and Billingham, United Kingdom.

The following table presents summary operating data for our AN segment:

	Year ended December 31,						
	2018	2017	2016	2018 v. 2017		2017 v. 2016	
	(in millions, except as noted)						
Net sales	$460	$497	$411	$(37)	(7)%	$86	21 %
Cost of sales	414	446	409	(32)	(7)%	37	9 %
Gross margin	$46	$51	$2	$(5)	(10)%	$49	N/M
Gross margin percentage	10.0 %	10.3 %	0.5 %	(0.3)%		9.8 %	
Sales volume by product tons (000s)	2,002	2,353	2,151	(351)	(15)%	202	9 %
Sales volume by nutrient tons (000s)[(1)]	676	793	726	(117)	(15)%	67	9 %
Average selling price per product ton	$230	$211	$191	$19	9 %	$20	10 %
Average selling price per nutrient ton[(1)]	$680	$627	$566	$53	8 %	$61	11 %
Gross margin per product ton	$23	$22	$1	$1	5 %	$21	N/M
Gross margin per nutrient ton[(1)]	$68	$64	$3	$4	6 %	$61	N/M
Depreciation and amortization	$85	$85	$93	$—	— %	$(8)	(9)%
Unrealized net mark-to-market loss (gain) on natural gas derivatives	$—	$2	$(10)	$(2)	(100)%	$12	N/M

N/M—Not Meaningful

(1) Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

Net Sales. Net sales in our AN segment decreased $37 million, or 7%, to $460 million in 2018 from $497 million in 2017 due primarily to a 15% decrease in sales volume, as a result of lower supply availability due to plant turnaround and maintenance activity. This decrease was partially offset by an increase in average selling prices of 9% as higher energy costs in Asia and Europe, along with continued enforcement of environmental regulations in China, resulted in lower production in these regions, tightening the global nitrogen supply and demand balance.

Cost of Sales. Cost of sales in our AN segment averaged $207 per ton in 2018, a 10% increase from $189 per ton in 2017. The increase was due primarily to higher realized natural gas costs in the United Kingdom and costs associated with plant turnaround and maintenance activity.

Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

Net Sales. Total net sales in our AN segment increased $86 million, or 21%, to $497 million in 2017 from $411 million in 2016 due to a 10% increase in average realized selling prices and a 9% increase in sales volume, due to the commencement of a new long-term supply arrangement and a strong summer sales campaign in the United Kingdom. The increase in average realized selling prices was net of the unfavorable impact of foreign exchange rate changes between the U.S. dollar and the British pound, which reduced net sales by $14 million.

Cost of Sales. Total cost of sales per ton in our AN segment averaged $189 in 2017, a 1% decrease from $190 per ton in 2016. The decrease was due primarily to the costs in 2016 related to the completion of the reconfiguration at our Yazoo City complex, the impact of foreign exchange rate changes between the U.S. dollar and the British pound, and plant outages in the prior year. These decreases in cost of sales were partially offset by higher realized natural gas costs and the impact of an unrealized net mark-to-market loss on natural gas derivatives in 2017 compared to a gain in

2016.

Other Segment

Our Other segment primarily includes the following products:

- Diesel exhaust fluid (DEF) is an aqueous urea solution typically made with 32.5% high-purity urea and 67.5% deionized water.
- Urea liquor is a liquid product that we sell in concentrations of 40%, 50% and 70% urea as a chemical intermediate.
- Nitric acid is a nitrogen-based product with a nitrogen content of 22.2%.
- Compound fertilizer products (NPKs) are solid granular fertilizer products for which the nutrient content is a combination of nitrogen, phosphorus and potassium.

The following table presents summary operating data for our Other segment:

	Year ended December 31,						
	2018	2017	2016	2018 v. 2017		2017 v. 2016	
	(in millions, except as noted)						
Net sales	$385	$319	$266	$66	21 %	$53	20 %
Cost of sales	335	272	217	63	23 %	55	25 %
Gross margin	$50	$47	$49	$3	6 %	$(2)	(4)%
Gross margin percentage	13.0 %	14.7 %	18.4 %	(1.7)%		(3.7)%	
Sales volume by product tons (000s)	2,252	2,044	1,654	208	10 %	390	24 %
Sales volume by nutrient tons (000s)[1]	439	397	317	42	11 %	80	25 %
Average selling price per product ton	$171	$156	$161	$15	10 %	$(5)	(3)%
Average selling price per nutrient ton[1]	$877	$804	$839	$73	9 %	$(35)	(4)%
Gross margin per product ton	$22	$23	$30	$(1)	(4)%	$(7)	(23)%
Gross margin per nutrient ton[1]	$114	$118	$155	$(4)	(3)%	$(37)	(24)%
Depreciation and amortization	$67	$57	$46	$10	18 %	$11	24 %
Unrealized net mark-to-market (gain) loss on natural gas derivatives	$(1)	$4	$(17)	$(5)	N/M	$21	N/M

N/M—Not Meaningful

(1) Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

Net Sales. Net sales in our Other segment increased $66 million, or 21%, to $385 million in 2018 from $319 million in 2017 due to a 10% increase in sales volume and a 10% increase in average selling prices. The increase in sales volume was due primarily to an increase in DEF and nitric acid sales volume due to higher demand. The increase in average selling prices was due to the impact of a tighter global nitrogen supply and demand balance.

Cost of Sales. Cost of sales in our Other segment averaged $149 per ton in 2018, a 12% increase from $133 per ton in 2017, due primarily to higher natural gas costs in the United Kingdom and plant turnaround and maintenance activity, and other plant outages, partially offset by the impact of a $1 million unrealized net mark-to-market gain on natural gas derivatives in 2018 compared to a $4 million loss in 2017.

Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

Net Sales. Total net sales in our Other segment increased $53 million, or 20%, to $319 million in 2017 from $266 million in 2016 due to a 24% increase in sales volume partially offset by a 3% decrease in average selling prices. The increase in our Other segment sales volume was due to an increase in DEF sales volume as demand in North America continued to grow. The decline in average selling prices was due to greater global nitrogen supply availability weighing on global nitrogen selling prices and the impact of foreign exchange rate changes between the U.S. dollar and the British pound, which reduced net sales by $6 million.

Cost of Sales. Cost of sales per ton in our Other segment averaged $133 in 2017, a 2% increase from $131 per ton in 2016, due primarily to the impact of an unrealized net mark-to-market loss on natural gas derivatives in 2017 compared to a gain in the comparable period of 2016, partially offset by the impact of foreign exchange rate changes between the U.S. dollar and the British pound and the impact of production efficiencies due to increased volume.

Liquidity and Capital Resources

Our primary uses of cash are generally for operating costs, working capital, capital expenditures, debt service, investments, taxes, share repurchases and dividends. Our working capital requirements are affected by several factors, including demand for our products, selling prices, raw material costs, freight costs and seasonal factors inherent in the business. Generally, our primary source of cash is cash from operations, which includes cash generated by customer advances. We may also from time to time access the capital markets or engage in borrowings under our credit agreement.

On April 2, 2018, we purchased all of the 4,612,562 publicly traded common units of TNCLP (the TNCLP Public Units) for $388 million. See discussion under "Acquisition of the TNCLP Public Units," below, for further information.

During the third and fourth quarters of 2018, we repurchased 10.9 million shares of our common stock for a total purchase price of $500 million. See discussion under "Share Repurchase Programs," below, for further information.

At December 31, 2018, we were in compliance with all applicable covenant requirements under the Revolving Credit Agreement, Public Senior Notes and Senior Secured Notes. There were no borrowings outstanding under the Revolving Credit Agreement as of December 31, 2018 or December 31, 2017, or during 2018 or 2017. See discussion under "Debt," below, for further information.

Our cash and cash equivalents balance was $682 million at December 31, 2018, a decrease of $153 million from $835 million at December 31, 2017.

Cash Equivalents

Cash equivalents include highly liquid investments that are readily convertible to known amounts of cash with original maturities of three months or less. Under our short-term investment policy, we may invest our cash balances, either directly or through mutual funds, in several types of investment-grade securities, including notes and bonds issued by governmental entities or corporations. Securities issued by governmental entities include those issued directly by the U.S. and Canadian federal governments; those issued by state, local or other governmental entities; and those guaranteed by entities affiliated with governmental entities.

Share Repurchase Programs

On August 1, 2018, our board of directors authorized the repurchase of up to $500 million of CF Holdings common stock through June 30, 2020 (the 2018 Share Repurchase Program). In 2018, we completed the 2018 Share Repurchase Program with the repurchase of 10.9 million shares for $500 million, of which $33 million was accrued and unpaid as of December 31, 2018. At December 31, 2018, we held 10,982,408 shares of treasury stock. The following table summarizes the share repurchases under the 2018 Share Repurchase Program:

	Shares	Amounts
	(in millions)	
Third quarter	1.8	$ 91
Fourth quarter	9.1	409
Total shares repurchased in 2018	10.9	$ 500

Subsequent to December 31, 2018, on February 13, 2019, the Board authorized the repurchase of up to $1 billion of CF Holdings common stock through December 31, 2021 (the 2019 Share Repurchase Program). Repurchases under the 2019 Share Repurchase Program may be made from time to time in the open market, through privately negotiated transactions, block transactions or otherwise. The manner, timing and amount of repurchases will be determined by our management based on the evaluation of market conditions, stock price, and other factors.

Capital Spending

We make capital expenditures to sustain our asset base, increase our capacity, improve plant efficiency and comply with various environmental, health and safety requirements. Capital expenditures totaled $422 million in 2018 compared to $473 million in 2017.

Capital expenditures in 2019 are estimated to be in the range of $400 to $450 million. Planned capital expenditures are subject to change due to delays in regulatory approvals or permitting, unanticipated increases in cost, changes in scope and completion time, performance of third parties, delay in the receipt of equipment, adverse weather, defects in materials and workmanship, labor or material shortages, transportation constraints, acceleration or delays in the timing of the work and other unforeseen difficulties.

Acquisition of the TNCLP Public Units

On February 7, 2018, we announced that, in accordance with the terms of TNCLP's First Amended and Restated Agreement of Limited Partnership (as amended by Amendment No. 1 to the First Amended and Restated Agreement of Limited Partnership), TNGP elected to exercise its right to purchase the TNCLP Public Units. TNGP completed its purchase of the TNCLP Public Units on April 2, 2018 (the Purchase), for an aggregate cash purchase price of $388 million. We funded the Purchase with cash on hand. Upon completion of the Purchase, CF Holdings owned, through its subsidiaries, 100 percent of the general and limited partnership interests of TNCLP.

Government Policies

The policies or laws of governments around the world can result in the imposition of taxes, duties, tariffs or other restrictions or regulatory requirements on imports and exports of raw materials, finished goods or services from a particular country or region of the world. The policies and laws of governments can also impact the subsidization of natural gas prices, and subsidies or quotas applied to domestic producers, or farmers. Due to the critical role that fertilizers play in food production, the construction and operation of fertilizer plants often are influenced by economic, political and social objectives. Additionally, the import or export of fertilizer can be subject to local taxes imposed by governments which can have the effect of either encouraging or discouraging import and export activity. The impact of changes in governmental policies or laws or the political or social objectives of a country could have a material impact on fertilizer demand and selling prices and therefore could impact our liquidity.

Ethanol Industry and the Renewable Fuel Standard

Corn used to produce ethanol accounts for approximately 37% of total U.S. corn demand. U.S. government policy, as expressed in the Renewable Fuel Standard (RFS), is a major determinant for the ethanol market. The RFS establishes minimum volumes of various types of renewable fuels, including ethanol, that must be included in the United States' supply of fuel for transportation. In addition, the U.S. Congress, at various times, has proposed legislation to either modify or eliminate the RFS. While past legislation proposing changes to the RFS has not been enacted into law, there can be no assurance that future legislation will not be enacted into law. Other factors that drive the ethanol market include the prices of ethanol, gasoline and corn. Lower gasoline prices may put pressure on ethanol prices that could result in reduced profitability and lower production for the ethanol industry, which could impact the demand for corn and nitrogen fertilizer and therefore could impact our liquidity.

Repatriation of Foreign Earnings and Income Taxes

We have operations in Canada, the United Kingdom and an interest in a joint venture in the Republic of Trinidad and Tobago. Historically, the estimated additional U.S. and foreign income taxes due upon repatriation of the earnings of these foreign operations to the U.S. were recognized in our consolidated financial statements as the earnings were recognized, unless the earnings were considered to be permanently reinvested based upon our then current plans. However, the cash payment of the income tax liabilities associated with repatriation of earnings from foreign operations occurred at the time of the repatriation. As a result, the recognition of income tax expense related to foreign earnings, as applicable, and the payment of taxes resulting from repatriation of those earnings could occur in different periods.

In light of changes made by the Tax Act, commencing with the 2018 tax year, the United States no longer taxes earnings of foreign subsidiaries even when such earnings are earned or repatriated to the United States, unless such earnings are subject to U.S. rules on passive income or certain anti-abuse provisions. Foreign subsidiary earnings may still be subject to withholding taxes when repatriated to the United States.

Cash balances held by our joint venture are maintained at sufficient levels to fund local operations as accumulated earnings are repatriated from the joint venture on a periodic basis.

As of December 31, 2018, approximately $33 million of our consolidated cash and cash equivalents balance of $682 million was held primarily by our Canadian and United Kingdom subsidiaries. Historically, the cash balance held by the Canadian subsidiaries represented accumulated earnings of our foreign operations that were not considered to be permanently reinvested. As of December 31, 2018, as a result of the amounts accrued in the transition tax liability recorded in 2017 and 2018 as a result of the Tax Act, we would not expect any additional cash tax cost to repatriate the Canadian and United Kingdom cash balances if we were to repatriate this cash in the future.

Debt

Revolving Credit Agreement

We have a senior secured revolving credit agreement (the Revolving Credit Agreement) providing for a revolving credit facility of up to $750 million with a maturity of September 18, 2020. The Revolving Credit Agreement includes a letter of credit sub-limit of $125 million. Borrowings under the Revolving Credit Agreement may be used for working capital and general corporate purposes. CF Industries is the borrower under the Revolving Credit Agreement and may also designate as borrowers one or more wholly owned subsidiaries that are organized in the United States or any state thereof, or the District of Columbia.

Borrowings under the Revolving Credit Agreement may be denominated in U.S. dollars, Canadian dollars, euro and British pounds, and bear interest at a per annum rate equal to an applicable eurocurrency rate or base rate plus, in either case, a specified margin, and the borrowers are required to pay an undrawn commitment fee on the undrawn portion of the commitments under the Revolving Credit Agreement and customary letter of credit fees. The specified margin and the amount of the commitment fee depend on CF Holdings' credit rating at the time.

The borrowers and guarantors under the Revolving Credit Agreement, which are currently comprised of CF Holdings, CF Industries and CF Holdings' wholly owned subsidiaries CF Industries Enterprises, Inc. (CFE), CF Industries Sales, LLC (CFS), and CF USA Holdings, LLC (CF USA), are referred to together herein as the Loan Parties. Subject to specified exceptions, the Revolving Credit Agreement requires that each direct or indirect domestic subsidiary of CF Holdings that guarantees debt for borrowed money of any Loan Party in excess of $150 million become a guarantor under the Revolving Credit Agreement. Subject to specified exceptions, the Revolving Credit Agreement requires a grant of a first priority security interest in substantially all of the assets of the Loan Parties, including a pledge by CF USA of its equity interests in CF Industries Nitrogen, LLC (CFN) and mortgages over certain material fee-owned domestic real properties, to secure the obligations of the Loan Parties thereunder.

In addition to the obligations under the Revolving Credit Agreement, the Loan Parties also guarantee the obligations under any (i) letter of credit facilities, letter of credit reimbursement agreements, letters of credit, letters of guaranty, surety bonds or similar arrangements in an aggregate amount up to $300 million and (ii) interest rate or other hedging arrangements, in each case between CF Holdings or certain of its subsidiaries, on the one hand, and any person that is a lender or the administrative agent under the Revolving Credit Agreement or an affiliate of such person, on the other hand, that are designated by CF Industries as Secured Bilateral LC Facilities or Secured Swap Agreements (each as defined in the Revolving Credit Agreement), as applicable, pursuant to the terms of the Revolving Credit Agreement (such additional obligations, the Additional Guaranteed Obligations). Obligations under Secured Bilateral LC Facilities in an aggregate amount up to $300 million and obligations under Secured Swap Agreements are secured by the same security interest that secures the obligations under the Revolving Credit Agreement.

The Revolving Credit Agreement contains representations and warranties and affirmative and negative covenants customary for a financing of this type. Prior to the effectiveness of an amendment entered into on October 31, 2016 and effective November 21, 2016 (the November 2016 Credit Agreement Amendment), the Revolving Credit Agreement limited the ability of non-guarantor subsidiaries of CF Holdings to incur indebtedness and limited the ability of CF Holdings and its subsidiaries to grant liens, merge or consolidate with other entities and sell, lease or transfer all or substantially all of the assets of CF Holdings and its subsidiaries to another entity, in each case, subject to specified exceptions. The November 2016 Credit Agreement Amendment modified the negative covenants in the Revolving Credit Agreement to limit further the ability of CF Holdings and its subsidiaries to grant liens and add limitations on the ability of CF Holdings and its subsidiaries to incur debt, pay dividends, voluntarily prepay certain debt, make investments and dispose of assets, in each case, subject to specified exceptions (such further and additional limitations, the Additional Negative Covenants).

The financial covenants applicable to CF Holdings and its subsidiaries in the Revolving Credit Agreement (the New Financial Covenants):

(i) restrict the ratio of total secured debt to EBITDA (as defined in the Revolving Credit Agreement) for the period of four consecutive fiscal quarters most recently ended to a maximum of 3.75:1.00,

(ii) require the ratio of EBITDA for the period of four consecutive fiscal quarters most recently ended to consolidated interest expense (as defined in the Revolving Credit Agreement) for the period of four consecutive fiscal quarters most recently ended to be a minimum of 1.20:1.00 for the fiscal quarters ending on or prior to December 31, 2018, and 1.50:1.00 thereafter, and

(iii) require the ratio of total debt to total capitalization as of the last day of any fiscal quarter to be less than or equal to 0.60:1.00.

Under the Revolving Credit Agreement, if on any date certain conditions were met, including (i) an absence of an event of default under the Revolving Credit Agreement, (ii) the receipt of an investment grade corporate rating for CF Holdings from two of three selected ratings agencies and (iii) the ratio of CF Holdings' total net debt to EBITDA for the period of four consecutive fiscal quarters most recently ended being less than 3.75:1.00, CF Industries would be able to, at its option, choose to (w) suspend the Additional Negative Covenants, (x) replace the New Financial Covenants with covenants requiring the ratio of total net debt to EBITDA for the period of four fiscal consecutive quarters most recently ended to be less than or equal to 3.75:1.00 and the ratio of EBITDA for the period of four consecutive fiscal quarters most recently ended to consolidated interest expense for the period of four consecutive fiscal quarters most recently ended to be not less than 2.75:1.00, (y) release the collateral securing the obligations under the Revolving Credit Agreement and (z) release the guarantees supporting, and the collateral securing, the Secured Bilateral LC Facilities and the Secured Swap Agreements. Such a choice by CF Industries would commence a "Covenant Suspension Period" that would expire upon the Company's no longer having an investment grade corporate rating from two of three selected rating agencies. Upon the expiration of a Covenant Suspension Period, the Additional Negative Covenants and the New Financial Covenants would be reinstated, and the Loan Parties party to the Revolving Credit Agreement would be required to guarantee the Additional Guaranteed Obligations and grant a first priority security interest in substantially all of each Loan Party's assets, including a pledge by CF USA of its equity interests in CFN and mortgages over certain material fee-owned domestic real properties, subject to certain exceptions, to secure the obligations under the Revolving Credit Agreement, the Secured Bilateral LC Facilities and the Secured Swap Agreements.

The Revolving Credit Agreement contains events of default (with notice requirements and cure periods, as applicable) customary for a financing of this type, including, but not limited to, non-payment of principal, interest or fees; inaccuracy of representations and warranties in any material respect; and failure to comply with specified covenants. Upon the occurrence and during the continuance of an event of default under the Revolving Credit Agreement and after any applicable cure period, subject to specified exceptions, the administrative agent may, and at the request of the requisite lenders is required to, accelerate the loans under the Revolving Credit Agreement or terminate the lenders' commitments under the Revolving Credit Agreement.

As of December 31, 2018, we had excess borrowing capacity under the Revolving Credit Agreement of $746 million (net of outstanding letters of credit of $4 million). There were no borrowings outstanding under the Revolving Credit Agreement as of December 31, 2018 or December 31, 2017, or during 2018 or 2017. Maximum borrowings outstanding under the Revolving Credit Agreement during the year ended December 31, 2016 were $150 million with a weighted-average annual interest rate of 1.85%.

The Revolving Credit Agreement contains representations and warranties and affirmative and negative covenants, including financial covenants. As of December 31, 2018, we were in compliance with all covenants under the Revolving Credit Agreement.

Letters of Credit

In addition to the letters of credit outstanding under the Revolving Credit Agreement, as described above, we have also entered into a bilateral agreement with capacity to issue letters of credit up to $125 million (reflecting an increase of $50 million in March 2018). As of December 31, 2018, approximately $114 million of letters of credit were outstanding under this agreement.

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Senior Notes

Long-term debt presented on our consolidated balance sheets as of December 31, 2018 and 2017 consisted of the following Public Senior Notes (unsecured) and Senior Secured Notes issued by CF Industries:

	Effective Interest Rate	December 31, 2018		December 31, 2017	
		Principal Outstanding	Carrying Amount [1]	Principal Outstanding	Carrying Amount [1]
		(in millions)			
Public Senior Notes:					
7.125% due May 2020	7.529%	500	497	500	496
3.450% due June 2023	3.562%	750	747	750	746
5.150% due March 2034	5.279%	750	740	750	739
4.950% due June 2043	5.031%	750	741	750	741
5.375% due March 2044	5.465%	750	741	750	741
Senior Secured Notes:					
3.400% due December 2021	3.782%	500	495	500	493
4.500% due December 2026	4.759%	750	737	750	736
Total long-term debt		$4,750	$ 4,698	$4,750	$ 4,692

(1) Carrying amount is net of unamortized debt discount and deferred debt issuance costs. Total unamortized debt discount was $11 million and $12 million as of December 31, 2018 and 2017, respectively, and total deferred debt issuance costs were $41 million and $46 million as of December 31, 2018 and 2017, respectively.

Public Senior Notes

Under the indentures (including the applicable supplemental indentures) governing our senior notes due 2020, 2023, 2034, 2043 and 2044 (the Public Senior Notes), each series of Public Senior Notes is guaranteed by CF Holdings, and CF Holdings' wholly owned subsidiaries CFE, CFS and CF USA. CFE, CFS and CF USA became subsidiary guarantors of the Public Senior Notes as a result of their becoming guarantors under the Revolving Credit Agreement. Interest on the Public Senior Notes is payable semiannually, and the Public Senior Notes are redeemable at our option, in whole at any time or in part from time to time, at specified make-whole redemption prices. The indentures governing the Public Senior Notes contain customary events of default (including cross-default triggered by acceleration of, or a principal payment default that is not cured within an applicable grace period under, other debt having a principal amount of $150 million or more) and covenants that limit, among other things, the ability of CF Holdings and its subsidiaries, including CF Industries, to incur liens on certain properties to secure debt.

If a Change of Control occurs together with a Ratings Downgrade (as both terms are defined under the indentures governing the Public Senior Notes), CF Industries would be required to offer to repurchase each series of Public Senior Notes at a price equal to 101% of the principal amount thereof, plus accrued and unpaid interest. In addition, in the event that a subsidiary of CF Holdings, other than CF Industries, becomes a borrower or a guarantor under the Revolving Credit Agreement (or any renewal, replacement or refinancing thereof), such subsidiary would be required to become a guarantor of the Public Senior Notes, provided that such requirement will no longer apply with respect to the Public Senior Notes due 2023, 2034, 2043 and 2044 following the repayment of the Public Senior Notes due 2020 or the subsidiaries of ours, other than CF Industries, otherwise becoming no longer subject to such a requirement to guarantee the Public Senior Notes due 2020.

On December 1, 2017, we redeemed all of the $800 million outstanding principal amount of the 6.875% senior notes due May 2018 (the 2018 Notes) in accordance with the optional redemption provisions provided in the indenture governing the 2018 Notes. The total aggregate redemption price was approximately $817 million. On December 26, 2017, we purchased approximately $300 million aggregate principal amount of the $800 million outstanding principal amount of 7.125% senior notes due 2020 (the 2020 Notes). The aggregate purchase price was approximately $331 million. As a result, we recognized a loss on debt extinguishment of $53 million, primarily consisting of $48 million of premiums paid for the early retirement of debt for the 2018 Notes and 2020 Notes.

Senior Secured Notes

On November 21, 2016, CF Industries issued $500 million aggregate principal amount of 3.400% senior secured notes due 2021 (the 2021 Notes) and $750 million aggregate principal amount of 4.500% senior secured notes due 2026 (the 2026 Notes, and together with the 2021 Notes, the Senior Secured Notes). The net proceeds, after deducting discounts and offering expenses, from the issuance and sale of the Senior Secured Notes were approximately $1.23 billion. CF Industries used approximately $1.18 billion of the net proceeds for the prepayment (including payment of a make-whole amount of approximately $170 million and accrued interest) in full of the outstanding $1.0 billion aggregate principal amount of the senior notes due 2022, 2025 and 2027 (Private Senior Notes) issued by CF Industries on September 24, 2015. Interest on the Senior Secured Notes is payable semiannually on December 1 and June 1 beginning on June 1, 2017, and the Senior Secured Notes are redeemable at our option, in whole at any time or in part from time to time, at specified make-whole redemption prices.

Under the terms of the applicable indenture, the Senior Secured Notes of each series are fully and unconditionally guaranteed on a senior secured basis, jointly and severally, by CF Holdings and each current and future domestic subsidiary of CF Holdings (other than CF Industries) that from time to time is a borrower, or guarantees indebtedness, under the Revolving Credit Agreement. The requirement for any subsidiary of CF Holdings to guarantee the Senior Secured Notes of a series will apply only until, and the subsidiary guarantees of the Senior Secured Notes of a series will be automatically released upon, the latest to occur of (a) CF Holdings having an investment grade corporate rating, with a stable or better outlook, from two of three selected ratings agencies and there being no default or event of default under the applicable Indenture and (b) the retirement, discharge or legal or covenant defeasance of, or satisfaction and discharge of the supplemental indenture governing, the Public Senior Notes due 2020 or the subsidiaries of CF Holdings (other than CF Industries) otherwise becoming no longer subject to the requirement, described in the second paragraph under "—Public Senior Notes," above, to guarantee the Public Senior Notes due 2020. In accordance with the applicable indenture, CFE and CFS, in addition to CF Holdings, guaranteed the Senior Secured Notes of each series upon the initial issuance of the Senior Secured Notes, and CF USA guaranteed the Senior Secured Notes of each series upon its becoming a guarantor under the Revolving Credit Agreement.

Subject to certain exceptions, the obligations under each series of Senior Secured Notes and each guarantor's related guarantee are secured by a first priority security interest in substantially all of the assets of CF Industries, CF Holdings and the subsidiary guarantors, including a pledge by CF USA of its equity interests in CFN and mortgages over certain material fee-owned domestic real properties (the Collateral). The obligations under the Revolving Credit Agreement, together with certain letter of credit, hedging and similar obligations and future pari passu secured indebtedness, will be secured by the Collateral on a pari passu basis with the Senior Secured Notes. The liens on the Collateral securing the obligations under the Senior Secured Notes of a series and the related guarantees will be automatically released and the covenant under the applicable indenture limiting dispositions of Collateral will no longer apply if, on any date after the initial issuance of the Senior Secured Notes, CF Holdings has an investment grade corporate rating, with a stable or better outlook, from two of three selected ratings agencies and there is no default or event of default under the applicable indenture.

Under each of the indentures governing the Senior Secured Notes, specified changes of control involving CF Holdings or CF Industries, when accompanied by a ratings downgrade, as defined with respect to the applicable series of Senior Secured Notes, constitute change of control repurchase events. Upon the occurrence of a change of control repurchase event with respect to the 2021 Notes or the 2026 Notes, as applicable, unless CF Industries has exercised its option to redeem such Senior Secured Notes, CF Industries will be required to offer to repurchase them at a price equal to 101% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of repurchase.

The indentures governing the Senior Secured Notes contain covenants that limit, among other things, the ability of CF Holdings and its subsidiaries, including CF Industries, to incur liens on certain assets to secure debt, to engage in sale and leaseback transactions, to sell or transfer Collateral, to merge or consolidate with other entities and to sell, lease or transfer all or substantially all of the assets of CF Holdings and its subsidiaries to another entity. Each of the indentures governing the Senior Secured Notes provides for customary events of default, which include (subject in certain cases to customary grace and cure periods), among others, nonpayment of principal or interest on the applicable Senior Secured Notes; failure to comply with other covenants or agreements under the indenture; certain defaults on other indebtedness; the failure of CF Holdings' or certain subsidiaries' guarantees of the applicable Senior Secured Notes to be enforceable; lack of validity or perfection of any lien securing the obligations under the Senior Secured Notes and the guarantees with respect to Collateral having an aggregate fair market value equal to or greater than a specified amount; and specified events of bankruptcy or insolvency. Under each indenture governing the Senior Secured Notes, in the case of an event of default arising from one of the specified events of bankruptcy or insolvency, the applicable Senior Secured Notes would become due and payable immediately, and, in the case of any other event of default (other than an event of default related to CF Industries' and CF Holdings' reporting obligations), the trustee or the holders of at least 25% in aggregate principal amount of the applicable Senior Secured Notes then outstanding may declare all of such Senior Secured Notes to be due and payable immediately.

Private Senior Notes

The senior notes due 2022, 2025 and 2027 (the Private Senior Notes), issued by CF Industries on September 24, 2015, were governed by the terms of a note purchase agreement (as amended, including by an amendment effective September 7, 2016, the Note Purchase Agreement). The Private Senior Notes were guaranteed by CF Holdings. All obligations under the Note Purchase Agreement were unsecured.

On November 21, 2016, we prepaid in full the outstanding $1.0 billion aggregate principal amount of our Private Senior Notes. The prepayment of $1.18 billion included the payment of a make-whole amount of approximately $170 million and accrued interest. Loss on debt extinguishment of $167 million on our consolidated statements of operations excludes $3 million of the make-whole payment, which was accounted for as a modification and recognized on our consolidated balance sheet as deferred financing fees, a reduction of long-term debt, and is being amortized using the effective interest rate method over the term of the Senior Secured Notes.

Bridge Credit Agreement

On September 18, 2015, in connection with our proposed combination with certain businesses of OCI, CF Holdings and CF Industries entered into a senior unsecured 364-Day Bridge Credit Agreement (as amended, the Bridge Credit Agreement). Upon the termination of the Combination Agreement on May 22, 2016, the lenders' commitments under the Bridge Credit Agreement terminated automatically. There were no borrowings under the Bridge Credit Agreement. See Note 13—Interest Expense for additional information.

Forward Sales and Customer Advances

We offer our customers the opportunity to purchase products from us on a forward basis at prices and on delivery dates we propose. Therefore, our reported fertilizer selling prices and margins may differ from market spot prices and margins available at the time of shipment.

Customer advances, which typically represent a portion of the contract's value, are received shortly after the contract is executed, with any remaining unpaid amount generally being collected by the time control transfers to the customer, thereby reducing or eliminating the accounts receivable related to such sales. Any cash payments received in advance from customers in connection with forward sales contracts are reflected on our consolidated balance sheets as a current liability until control transfers and revenue is recognized. As of December 31, 2018 and 2017, we had $149 million and $89 million, respectively, in customer advances on our consolidated balance sheets.

While customer advances are generally a significant source of liquidity, the level of forward sales contracts is affected by many factors including current market conditions and our customers' outlook of future market fundamentals. During periods of declining prices, customers tend to delay purchasing fertilizer in anticipation that prices in the future will be lower than the current prices. If the level of sales under our forward sales programs were to decrease in the future, our cash received from customer advances would likely decrease and our accounts receivable balances would likely increase. Additionally, borrowing under the Revolving Credit Agreement could become necessary. Due to the volatility inherent in our business and changing customer expectations, we cannot estimate the amount of future forward sales activity.

Under our forward sales programs, a customer may delay delivery of an order due to weather conditions or other factors. These delays generally subject the customer to potential charges for storage or may be grounds for termination of the contract by us. Such a delay in scheduled shipment or termination of a forward sales contract due to a customer's inability or unwillingness to perform may negatively impact our reported sales.

Natural Gas Prices

Natural gas is the principal raw material used to produce nitrogen fertilizers. We use natural gas both as a chemical feedstock and as a fuel to produce ammonia, granular urea, UAN, AN and other nitrogen products. Expenditures on natural gas represent a significant portion of our production costs. For example, natural gas costs, including realized gains and losses, comprised approximately 40% of our total production costs in 2018. As a result, natural gas prices have a significant impact on our operating expenses and can thus affect our liquidity.

Because most of our nitrogen fertilizer manufacturing facilities are located in the United States and Canada, the price of natural gas in North America directly impacts a substantial portion of our operating expenses. Due to increases in natural gas production resulting from the rise in production from shale gas formations, natural gas prices in North America have declined since 2008, but are subject to volatility. During 2018, the daily closing price at the Henry Hub, the most heavily-traded natural gas pricing point in North America, reached a low of $2.48 per MMBtu on four consecutive days in February 2018 and a high of $6.88 per MMBtu on January 4, 2018. During the three-year period ended December 31, 2018, the daily closing price at the Henry Hub reached a low of $1.49 per MMBtu on three consecutive days in March 2016 and a high of $6.88 per MMBtu on January 4, 2018.

We also have manufacturing facilities located in the United Kingdom. These facilities are subject to fluctuations associated with the price of natural gas in Europe. The major natural gas trading point for the United Kingdom is the National Balancing Point (NBP). During 2018, the daily closing price at NBP reached a low of $6.60 per MMBtu on two consecutive days in January 2018 and a high of $31.74 per MMBtu on March 2, 2018. During the three-year period ended December 31, 2018, the daily closing price at NBP reached a low of $2.80 per MMBtu on September 1, September 12 and September 14, 2016, and a high of $31.74 per MMBtu on March 2, 2018.

Natural gas costs in our cost of sales, including the impact of realized natural gas derivatives, decreased 7% per MMBtu in 2018 from 2017.

Derivative Financial Instruments

We may use derivative financial instruments to reduce our exposure to changes in prices for natural gas that will be purchased in the future. Natural gas is the largest and most volatile component of our manufacturing cost for nitrogen-based fertilizers. From time to time, we may also use derivative financial instruments to reduce our exposure to changes in foreign currency exchange rates. Volatility in reported quarterly earnings can result from the unrealized mark-to-market adjustments in the value of the derivatives. In 2018, 2017 and 2016, we recognized unrealized net mark-to-market (gains) losses on natural gas derivatives of $(13) million, $61 million and $(260) million, respectively, which is reflected in cost of sales in our consolidated statements of operations.

Derivatives expose us to counterparties and the risks associated with their ability to meet the terms of the contracts. For derivatives that are in net asset positions, we are exposed to credit loss from nonperformance by the counterparties. We control our credit risk through the use of multiple counterparties that are multinational commercial banks, other major financial institutions or large energy companies, and, in most cases, the use of International Swaps and Derivatives Association (ISDA) master netting arrangements. The ISDA agreements are master netting arrangements commonly used for over-the-counter derivatives that mitigate exposure to counterparty credit risk, in part, by creating contractual rights of netting and setoff, the specifics of which vary from agreement to agreement. The ISDA agreements for most of our derivative instruments contain credit-risk-related contingent features, such as cross default provisions and credit support thresholds. In the event of certain defaults or a credit ratings downgrade, our counterparty may request early termination and net settlement of certain derivative trades or may require us to collateralize derivatives in a net liability position. The Revolving Credit Agreement, at any time when it is secured, provides a cross collateral feature for those of our derivatives that are with counterparties that are party to, or affiliates of parties to, the Revolving Credit Agreement so that no separate collateral would be required for those counterparties in connection with such derivatives. In the event the Revolving Credit Agreement becomes unsecured, separate collateral could be required in connection with such derivatives.

As of December 31, 2018 and 2017, the aggregate fair value of the derivative instruments with credit-risk-related contingent features in net liability positions was zero and $12 million, respectively, which also approximates the fair value of the maximum amount of additional collateral that would need to be posted or assets needed to settle the obligations if the credit-risk-related contingent features were triggered at the reporting dates. As of December 31, 2018, we had open natural gas derivative contracts for 6.6 million MMBtus of natural gas basis swaps. As of December 31, 2017, we had open natural gas derivative contracts for 35.9 million MMBtus that included natural gas fixed price swaps and basis swaps. At both December 31, 2018 and 2017, we had no cash collateral on deposit with counterparties for derivative contracts. The credit support documents executed in connection with certain of our ISDA agreements generally provide us and our counterparties the right to set off collateral against amounts owing under the ISDA agreements upon the occurrence of a default or a specified termination event.

Embedded Derivative Liability

Under the terms of our strategic venture with CHS, if our credit rating as determined by two of three specified credit rating agencies is below certain levels, we are required to make a non-refundable yearly payment of $5 million to CHS. Since our credit ratings were below certain levels in 2016, 2017 and 2018, we made a payment of $5 million to CHS in each year. These payments will continue on a yearly basis until the earlier of the date that our credit rating is upgraded to or above certain levels by two of three specified credit rating agencies or February 1, 2026.

This obligation is recognized on our consolidated balance sheet as an embedded derivative and its value is included in other liabilities. See Note 9—Fair Value Measurements for additional information.

Defined Benefit Pension Plans

We contributed $39 million to our pension plans in 2018. We expect to contribute approximately $62 million to our pension plans in 2019.

Distributions on Noncontrolling Interest in CFN

The CFN Board of Managers approved semi-annual distribution payments during the years ended December 31, 2018, 2017 and 2016, in accordance with CFN's limited liability company agreement, as follows:

Approved and paid	Distribution Period	Distribution Amount (in millions)
First quarter of 2019	Six months ended December 31, 2018	$ 86
Third quarter of 2018	Six months ended June 30, 2018	79
First quarter of 2018	Six months ended December 31, 2017	49
Third quarter of 2017	Six months ended June 30, 2017	59
First quarter of 2017	Six months ended December 31, 2016	48
Third quarter of 2016	February 1, 2016 to June 30, 2016	79

Cash Flows

Operating Activities

Net cash provided by operating activities in 2018 was $1,497 million as compared to $1,631 million in 2017, a decline of $134 million. The decline was primarily due to our receipt in 2017 of an $815 million income tax refund as a result of the claim to carry back the 2016 federal tax loss to prior income tax years. The remaining change in net cash from operating activities is an increase in cash from operations in 2018 of $681 million as compared to 2017. This increase was due primarily to an increase in operating earnings of the business, lower usage of working capital in 2018 in the areas of accounts receivable and accounts payable and accruals, and lower pension contributions in 2018. In 2018, we contributed $39 million to our pension plans compared to $82 million in 2017.

Net cash provided by operating activities in 2017 was $1,631 million as compared to $617 million in 2016, an increase of $1,014 million. The increase was primarily due to working capital changes including the receipt of our $815 million income tax refund related to the claim to carry back the 2016 federal tax loss to prior income tax years. The increase in net cash provided by operating activities was also a result of entering 2017 with a lower level of customer advances than 2016 due to customer reluctance to enter into prepaid contracts in a declining fertilizer price environment. These increases were partially offset by higher contributions to our pension plans. In 2017, we contributed $82 million to our pension plans compared to $23 million in 2016.

Investing Activities

Net cash used in investing activities was $375 million in 2018 compared to $413 million in 2017. During 2018, capital expenditures totaled $422 million compared to $473 million in 2017. Net cash used in investing activities in 2018 included $10 million related to property insurance proceeds received. Net cash used in investing activities of $2.20 billion in 2016 included $2.21 billion in capital expenditures, primarily related to our capacity expansion projects that were completed as of December 31, 2016.

Financing Activities

Net cash used in financing activities was $1.27 billion in 2018 compared to $1.56 billion in 2017 and compared to net cash provided by financing activities of $2.44 billion in 2016.

Net cash used in financing activities in 2018 included $388 million related to our acquisition of all of the outstanding publicly traded common units of TNCLP. In addition, we repurchased 10.9 million of our common shares for $500 million, of which $33 million was accrued and unpaid as of December 31, 2018. In 2018, 2017 and 2016, we distributed $139 million, $131 million and $119 million, respectively, to the noncontrolling interests in CFN and TNCLP.

In 2017, we paid $1.15 billion in connection with the redemption of $800 million in aggregate principal amount of our 2018 Notes, the purchase of approximately $300 million aggregate principal amount of our 2020 Notes pursuant to a tender offer and premiums paid for the early retirement of long-term debt. In 2016, CHS made a capital contribution of $2.8 billion to CFN, a subsidiary of CF Holdings, in exchange for membership interests in CFN. We also received proceeds of approximately $1.24 billion, net of discounts, from the issuance of the Senior Secured Notes which were used to fund the prepayment of the $1.0 billion of Private Senior Notes and the related make-whole payment of $170 million.

Contractual Obligations

The following is a summary of our contractual obligations as of December 31, 2018:

	2019	2020	2021	2022	2023	After 2023	Total
	(in millions)						
Contractual Obligations							
Debt							
Long-term debt[1]	$—	$500	$500	$—	$750	$3,000	$4,750
Interest payments on long-term debt[1]	230	211	191	176	163	2,054	3,025
Other Obligations							
Operating leases	93	80	59	41	28	62	363
Equipment purchases and plant improvements	114	11	1	—	—	—	126
Transportation[2]	12	6	3	—	—	—	21
Purchase obligations[3][4]	789	64	48	36	34	62	1,033
Contributions to pension plans[5]	62	—	—	—	—	—	62
Total[6][7][8]	$1,300	$872	$802	$253	$975	$5,178	$9,380

(1) Based on debt balances before discounts, offering expenses and interest rates as of December 31, 2018.

(2) Includes anticipated expenditures under certain contracts to transport finished product to and from our facilities. The majority of these arrangements allow for reductions in usage based on our actual operating rates. Amounts set forth in this table are based on projected normal operating rates and contracted or current spot prices, where applicable, as of December 31, 2018 and actual operating rates and prices may differ.

(3) Includes minimum commitments to purchase and transport natural gas based on prevailing market-based forward prices as of December 31, 2018 excluding reductions for plant maintenance and turnaround activities. Purchase obligations do not include any amounts related to our natural gas derivatives. See Note 15—Derivative Financial Instruments for additional information.

(4) Includes a commitment to purchase ammonia from PLNL at market-based prices under an agreement that expires in September 2019. The purchase commitment is $58 million based on market prices as of December 31, 2018. This agreement includes automatic consecutive one-year renewals, unless otherwise terminated by either party in advance. Assuming the agreement is not terminated by either party and based on market prices as of December 31, 2018, the annual commitment would be $77 million.

(5) Represents the contributions we expect to make to our pension plans during 2019. Our pension funding policy is to contribute amounts sufficient to meet minimum legal funding requirements plus discretionary amounts that we may deem to be appropriate.

(6) Excludes $155 million of unrecognized tax benefits, due to the uncertainty in the timing of potential tax payments, and the transition tax liability of $72 million resulting from the enactment of the Tax Act. See Note 10—Income Taxes for additional information.

(7) Excludes $9 million of environmental remediation liabilities due to the uncertainty in the timing of payments.

(8) Excludes $5 million annual payments to CHS related to our embedded derivative due to uncertainty of future credit ratings, as this is only applicable until the earlier of the date that our credit rating is upgraded to or above certain levels by two of three specified credit rating agencies or February 1, 2026. See Note 9—Fair Value Measurements or Note 17—Noncontrolling Interests for additional information.

Off-Balance Sheet Arrangements

We have operating leases for certain property and equipment under various noncancelable agreements, the most significant of which are rail car leases and barge tow charters for the transportation of our products. The rail car leases currently have minimum terms ranging from one to eleven years and the barge charter commitments range from two to seven years. We also have terminal and warehouse storage agreements for our distribution system, some of which contain minimum throughput requirements. The storage agreements contain minimum terms generally ranging from one to five years and commonly contain provisions for automatic annual renewal thereafter unless canceled by either party. See Note 24—Leases for additional information.

We do not have any other off-balance sheet arrangements that have or are reasonably likely to have a material current or future effect on our financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources.

Critical Accounting Policies and Estimates

Our discussion and analysis of our financial condition, results of operations, liquidity and capital resources is based upon our consolidated financial statements, which have been prepared in accordance with U.S. GAAP. U.S. GAAP requires that we select policies and make estimates and judgments that affect the reported amounts of assets, liabilities, revenues, expenses and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate our estimates. We base our estimates on historical experience, technological assessment, opinions of appropriate outside experts, and the most recent information available to us. Actual results may differ from these estimates. Changes in estimates that may have a material impact on our results are discussed in the context of the underlying financial statements to which they relate. The following discussion presents information about our most critical accounting policies and estimates.

Income Taxes

We recognize expenses, assets and liabilities for income taxes based on estimates of amounts that ultimately will be determined to be taxable or deductible in tax returns filed in various jurisdictions. U.S. income taxes are provided on that portion of the earnings of foreign subsidiaries that is expected to be remitted to the U.S. and be taxable. The final taxes paid are dependent upon many factors and judgments, including negotiations with taxing authorities in various jurisdictions and resolution of disputes arising from federal, state and international tax audits. The judgments made at any point in time may change from previous conclusions based on the outcome of tax audits, as well as changes to, or further interpretations of, tax laws and regulations. We adjust income tax expense in the period in which these changes occur.

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those differences are projected to be recovered or settled. Realization of deferred tax assets is dependent on our ability to generate sufficient taxable income of an appropriate character in future periods. A valuation allowance is established if it is determined to be more likely than not that a deferred tax asset will not be realized. Significant judgment is applied in evaluating the need for and the magnitude of appropriate valuation allowances against deferred tax assets. Interest and penalties related to unrecognized tax benefits are reported as interest expense and income tax expense, respectively.

Historically, a deferred income tax liability was recorded for income taxes that would result from the repatriation of the portion of the investment in our non-U.S. subsidiaries and joint venture that were considered to not be permanently reinvested. No deferred income tax liability was recorded for the remainder of our investment in non-U.S. subsidiaries and joint venture, which we believed to be permanently reinvested. In light of changes made by the Tax Act, the Company continues to evaluate whether it will continue to treat foreign subsidiary earnings as being permanently reinvested.

As a large commercial enterprise with international operations, our income tax expense and our effective tax rate may change from period to period due to many factors. The most significant of these factors are changes in tax legislation in the countries in which we operate, changes in the geographic mix of earnings, the tax characteristics of our income, the ability to realize certain foreign tax credits and net operating losses, and the portion of the income of our foreign subsidiaries and foreign joint venture that could be subjected to U.S. taxation. It is reasonably likely that these items will impact income tax expense, net income and liquidity in future periods.

We operate in a number of countries and as a result have a significant amount of cross border transactions. The taxability of cross border transactions has received an increasing level of scrutiny among regulators in countries across the globe, including the countries in which we operate. The tax rules and regulations within the various countries in which we operate are complex and in many cases there is not symmetry between the rules of the various countries. As a result, there are instances where regulators within the countries involved in a cross border transaction may reach different conclusions regarding the taxability of the transaction in their respective jurisdictions based on the same set of facts and circumstances. We work closely with regulators to reach a common understanding and conclusion regarding the taxability of cross border transactions. However, there are instances where reaching a common understanding is not possible or practical. As of December 31, 2018, we have recorded a reserve for unrecognized tax benefits, including penalties and interest, of $155 million, which is related predominantly to certain potential tax exposures involving cross border transactions. This amount represents our best estimate of the potential amounts due based on our interpretations of the rules and the facts and circumstances of the transactions. Differences in interpretation of the tax laws, including agreements between governments surrounding our cross border transactions, can result in differences in taxes paid which may be higher or lower than our estimates.

Recoverability of Long-Lived Assets, Goodwill and Investments in Unconsolidated Subsidiaries

We review the carrying values of our property, plant and equipment and other long-lived assets, including our finite-lived intangible assets, goodwill and investments in affiliates including joint ventures in accordance with U.S. GAAP in order to assess recoverability. Factors that we must estimate when performing impairment tests include sales volume, selling prices, raw material costs, operating rates, operating expenses, inflation, discount rates, exchange rates, tax rates and capital spending. Significant judgment is involved in estimating each of these factors, which include inherent uncertainties. The factors we use are consistent with those used in our internal planning process. The recoverability of the values associated with our goodwill, long-lived assets and investments in unconsolidated affiliates is dependent upon future operating performance of the specific businesses to which they are attributed. Certain of the operating assumptions are particularly sensitive to the cyclical nature of the fertilizer business. Adverse changes in demand for our products, increases in supply and the availability and costs of key raw materials could significantly affect the results of our review.

The recoverability and impairment tests of long-lived assets are required only when conditions exist that indicate the carrying value may not be recoverable. For goodwill, impairment tests are required at least annually, or more frequently if events or circumstances indicate that it may be impaired. Our investments in unconsolidated affiliates are reviewed for impairment whenever events or circumstances indicate that the carrying value may not be recoverable. When circumstances indicate that the fair value of our investment in any such affiliate is less than its carrying value, and the reduction in value is other than temporary, the reduction in value is recognized immediately in earnings.

PLNL is our joint venture investment in the Republic of Trinidad and Tobago and operates an ammonia plant that relies on natural gas supplied, under the NGC Contract, by NGC. The joint venture is accounted for under the equity method. The joint venture experienced past curtailments in the supply of natural gas from NGC, which reduced the ammonia production at PLNL. The NGC Contract had an initial expiration date of September 2018 and was extended on the same terms until September 2023. Any NGC commitment to supply gas beyond 2023 will be based on new agreements.

As part of our impairment assessment of our equity method investment in PLNL, we determined the carrying value exceeded the fair value and recognized a $134 million impairment charge in 2016 related to our equity method investment in PLNL. The carrying value of our equity method investment in PLNL at December 31, 2018 is $93 million. If NGC does not make sufficient quantities of natural gas available to PLNL at prices that permit profitable operations, PLNL may cease operating its facility and we would write off the remaining investment in PLNL.

The U.K. Government held a referendum on the U.K.'s membership in the European Union in June 2016, which resulted in the electorate voting in favor of the U.K. exit from the European Union (Brexit). A process of negotiation is now taking place to determine the future terms of the United Kingdom's relationship with the European Union, with the United Kingdom due to exit the European Union on March 29, 2019. We operate two nitrogen manufacturing facilities in the United Kingdom, which utilize foreign-sourced materials and equipment, and which also export products in addition to serving customers in the United Kingdom. Brexit, including its indirect effects, could impact us in the future. For example, the cost and availability of natural gas or other raw materials or equipment that we purchase and the demand or selling prices for the nitrogen products that we sell, could be impacted by changes in tariffs, duties, trade restrictions or other factors. Brexit could lead to changes in trade flows, trading relationships, the movement of production to alternative locations, or the curtailment of certain production at certain sites. Brexit could also impact foreign exchange rates or U.K. interest rates, which could impact our operations or the valuation of our assets and liabilities. Since the U.K. referendum in June 2016, the United Kingdom has experienced increases in the volatility of foreign exchange rates, which impacted our operations. As a result of the uncertainty of Brexit, including its indirect effects, changes in the future profitability, asset utilization, or business valuation of our U.K. operations could negatively impact us and may result in an impairment of our long-lived assets or goodwill. As of December 31, 2018, long-lived assets, including property, plant and equipment and intangible assets, and goodwill related to the United Kingdom were $742 million and $264 million, respectively.

We evaluate goodwill for impairment in the fourth quarter at the reporting unit level. Our evaluation can begin with a qualitative assessment of the factors that could impact the significant inputs used to estimate fair value. If after performing the qualitative assessment, we determine that it is not more likely than not that the fair value of a reporting unit is less than its carrying amount, including goodwill, then no further analysis is necessary. However, if it is unclear based on the results of the qualitative test, we perform a quantitative test, which involves comparing the fair value of a reporting unit with its carrying amount, including goodwill. We use an income-based valuation method, determining the present value of future cash flows, to estimate the fair value of a reporting unit. If the fair value of a reporting unit exceeds its positive carrying amount, goodwill of the reporting unit is considered not impaired, and no further testing is necessary. If the fair value of the reporting unit is less than its carrying amount, goodwill impairment would be recognized equal to the amount of the carrying value in excess of the reporting unit's fair value, limited to the total amount of goodwill allocated to the reporting unit. We identified no goodwill impairment in our 2018, 2017 or 2016 reviews. As of December 31, 2018 and 2017, the carrying value of our goodwill was $2.35 billion and $2.37 billion, respectively.

Intangible assets identified in connection with our 2010 acquisition of Terra Industries Inc. consist of customer relationships, which are being amortized over a period of 18 years. The intangible assets identified in connection with our 2015 acquisition of CF Fertilisers UK consist of customer relationships and trade names which are being amortized over a period of approximately 20 years. Our intangible assets are presented in other assets on our consolidated balance sheets. See Note 7—Goodwill and Other Intangible Assets for additional information regarding our goodwill and other intangible assets.

Pension Assets and Liabilities

Pension assets and liabilities are affected by the fair value of plan assets, estimates of the expected return on plan assets, plan design, actuarial estimates and discount rates. Actual changes in the fair value of plan assets and differences between the actual return on plan assets and the expected return on plan assets affect the amount of pension expense ultimately recognized. Key assumptions that affect our projected benefit obligation (PBO) are discount rates and, in addition for our United Kingdom plans, an adjusted retail price index (RPI). Key assumptions affecting pension expense include discount rates, the expected long-term rate of return on assets (EROA) and, in addition for our United Kingdom plans, RPI.

The December 31, 2018 PBO was computed based on a weighted-average discount rate of 4.1% for our North America plans and 2.9% for our United Kingdom plans, which were based on yields for high-quality (AA rated or better) fixed income debt securities that match the timing and amounts of expected benefit payments as of the measurement date of December 31. Declines in comparable bond yields would increase our PBO. The weighted-average discount rate used to calculate pension expense in 2018 was 3.6% for North America plans and 2.5% for United Kingdom plans. Our net benefit obligation, after deduction of plan assets, could increase or decrease depending on the extent to which returns on pension plan assets are lower or higher than the discount rate. The 4.5% weighted-average EROA used to calculate pension expense in 2018 for our North America plans is based on studies of actual rates of return achieved by equity and non-equity investments, both separately and in combination over historical holding periods. The 4.2% weighted-average EROA used to calculate pension expense in 2018 for our United Kingdom plans is based on expected long-term performance of underlying investments. The EROA for both North America and United Kingdom plans are adjusted for expenses and diversification bonuses. The 3.3% RPI used to calculate our United Kingdom plan PBO and the 3.2% RPI used to calculate 2018 pension expense is developed using the Bank of England implied retail price inflation curve, which is based on the difference between yields on fixed interest government bonds and index-linked government bonds.

For North America qualified pension plans, our PBO was $742 million as of December 31, 2018, which was $69 million higher than pension plan assets. For our United Kingdom pension plans, our PBO was $524 million as of December 31, 2018 which was $141 million higher than pension plan assets. The tables below estimate the impact of a 50 basis point increase or decrease in the key assumptions on our December 31, 2018 PBO and 2018 pension expense:

	North America Plans			
	Increase/(Decrease) in December 31, 2018 PBO		Increase/(Decrease) in 2018 Pension Expense	
Assumption	+50 bps	-50 bps	+50 bps	-50 bps
	(in millions)			
Discount Rate	$(40)	$44	$ (2)	$ 3
EROA	N/A	N/A	(3)	3

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	United Kingdom Plans			
	Increase/(Decrease) in December 31, 2018 PBO		Increase/(Decrease) in 2018 Pension Expense	
Assumption	+50 bps	-50 bps	+50 bps	-50 bps
	(in millions)			
Discount Rate	$(39)	$44	$ 1	$ —
EROA	N/A	N/A	(2)	2
RPI	24	(24)	1	(1)

See Note 11—Pension and Other Postretirement Benefits for further discussion of our pension plans.

Recent Accounting Pronouncements

See Note 3—New Accounting Standards for a discussion of recent accounting pronouncements.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.

We are exposed to the impact of changes in commodity prices, interest rates and foreign currency exchange rates.

Commodity Prices

Our net sales, cash flows and estimates of future cash flows related to nitrogen-based fertilizers are sensitive to changes in fertilizer prices as well as changes in the prices of natural gas and other raw materials unless these costs have been fixed or hedged. A $1.00 per MMBtu change in the price of natural gas would change the cost to produce a ton of ammonia, granular urea, UAN (32%) and AN by approximately $33, $22, $16 and $16, respectively.

Natural gas is the largest and most volatile component of the manufacturing cost for nitrogen-based fertilizers. We manage the risk of changes in natural gas prices primarily with the use of derivative financial instruments. The derivative instruments that we use are primarily natural gas fixed price swaps, natural gas basis swaps and natural gas options. These derivatives settle using primarily a NYMEX futures price index, which represents the basis for fair value at any given time. The contracts represent anticipated natural gas needs for future periods and settlements are scheduled to coincide with anticipated natural gas purchases during those future periods. As of December 31, 2018, we had natural gas basis swaps covering certain periods through March 2019.

As of December 31, 2018 and 2017, we had open derivative contracts for 6.6 million MMBtus and 35.9 million MMBtus, respectively. A $1.00 per MMBtu increase in the forward curve prices of natural gas at December 31, 2018 would result in a favorable change in the fair value of these derivative positions of $7 million, and a $1.00 per MMBtu decrease in the forward curve prices of natural gas would change their fair value unfavorably by $7 million.

From time to time we may purchase nitrogen products on the open market to augment or replace production at our facilities.

Interest Rates

As of December 31, 2018, we had seven series of senior notes totaling $4.75 billion of principal outstanding with maturity dates of May 1, 2020, December 1, 2021, June 1, 2023, December 1, 2026, March 15, 2034, June 1, 2043 and March 15, 2044. The senior notes have fixed interest rates. As of December 31, 2018, the carrying value and fair value of our senior notes was approximately $4.70 billion and $4.27 billion, respectively.

Borrowings under the Revolving Credit Agreement bear current market rates of interest and we are subject to interest rate risk on such borrowings. There were no borrowings outstanding under the Revolving Credit Agreement as of December 31, 2018 or December 31, 2017, or during 2018 or 2017.

Foreign Currency Exchange Rates

We are directly exposed to changes in the value of the Canadian dollar, the British pound and the euro. We generally do not maintain any exchange rate derivatives or hedges related to these currencies.

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ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA.

Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
CF Industries Holdings, Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of CF Industries Holdings, Inc. and subsidiaries (the "Company") as of December 31, 2018 and 2017, the related consolidated statements of operations, comprehensive income (loss), 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 22, 2019 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Basis for Opinion

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

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

(signed) KPMG LLP

We have served as the Company's auditor since 1983.
Chicago, Illinois
February 22, 2019

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CF INDUSTRIES HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS

	Year ended December 31,		
	2018	2017	2016
	(in millions, except per share amounts)		
Net sales	$4,429	$4,130	$3,685
Cost of sales	3,512	3,696	2,842
Gross margin	917	434	843
Selling, general and administrative expenses	214	191	173
Transaction costs	—	—	179
Other operating—net	(27)	18	208
Total other operating costs and expenses	187	209	560
Equity in earnings (loss) of operating affiliates	36	9	(145)
Operating earnings	766	234	138
Interest expense	241	315	200
Interest income	(13)	(12)	(5)
Loss on debt extinguishment	—	53	167
Other non-operating—net	(9)	3	2
Earnings (loss) before income taxes	547	(125)	(226)
Income tax provision (benefit)	119	(575)	(68)
Net earnings (loss)	428	450	(158)
Less: Net earnings attributable to noncontrolling interests	138	92	119
Net earnings (loss) attributable to common stockholders	$290	$358	$(277)
Net earnings (loss) per share attributable to common stockholders:			
Basic	$1.25	$1.53	$(1.19)
Diluted	$1.24	$1.53	$(1.19)
Weighted-average common shares outstanding:			
Basic	232.6	233.5	233.1
Diluted	233.8	233.9	233.1

See Accompanying Notes to Consolidated Financial Statements.

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CF INDUSTRIES HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

	Year ended December 31,		
	2018	2017	2016
	(in millions)		
Net earnings (loss)	$428	$450	$(158)
Other comprehensive (loss) income:			
Foreign currency translation adjustment—net of taxes	(105)	127	(74)
Derivatives—net of taxes	—	(1)	—
Defined benefit plans—net of taxes	8	9	(74)
	(97)	135	(148)
Comprehensive income (loss)	331	585	(306)
Less: Comprehensive income attributable to noncontrolling interests	138	92	119
Comprehensive income (loss) attributable to common stockholders	$193	$493	$(425)

See Accompanying Notes to Consolidated Financial Statements.

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CF INDUSTRIES HOLDINGS, INC.

CONSOLIDATED BALANCE SHEETS

	December 31, 2018	December 31, 2017
	(in millions, except share and per share amounts)	
Assets		
Current assets:		
Cash and cash equivalents	$682	$835
Accounts receivable—net	235	307
Inventories	309	275
Prepaid income taxes	28	33
Other current assets	20	15
Total current assets	1,274	1,465
Property, plant and equipment—net	8,623	9,175
Investment in affiliate	93	108
Goodwill	2,353	2,371
Other assets	318	344
Total assets	$12,661	$13,463
Liabilities and Equity		
Current liabilities:		
Accounts payable and accrued expenses	$545	$472
Income taxes payable	5	2
Customer advances	149	89
Other current liabilities	6	17
Total current liabilities	705	580
Long-term debt	4,698	4,692
Deferred income taxes	1,117	1,047
Other liabilities	410	460
Equity:		
Stockholders' equity:		
Preferred stock—$0.01 par value, 50,000,000 shares authorized	—	—
Common stock—$0.01 par value, 500,000,000 shares authorized, 2018—233,800,903 shares issued and 2017—233,287,799 shares issued	2	2
Paid-in capital	1,368	1,397
Retained earnings	2,463	2,443
Treasury stock—at cost, 2018—10,982,408 shares and 2017—710 shares	(504)	—
Accumulated other comprehensive loss	(371)	(263)
Total stockholders' equity	2,958	3,579
Noncontrolling interests	2,773	3,105
Total equity	5,731	6,684
Total liabilities and equity	$12,661	$13,463

See Accompanying Notes to Consolidated Financial Statements.

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CF INDUSTRIES HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF EQUITY

	Common Stockholders							
	$0.01 Par Value Common Stock	Treasury Stock	Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Loss	Total Stockholders' Equity	Noncontrolling Interests	Total Equity
	(in millions)							
Balance as of December 31, 2015	$2	$(153)	$1,378	$3,058	$(250)	$4,035	$352	$4,387
Net (loss) earnings	—	—	—	(277)	—	(277)	119	(158)
Other comprehensive loss	—	—	—	—	(148)	(148)	—	(148)
Retirement of treasury stock	—	150	(14)	(136)	—	—	—	—
Acquisition of treasury stock under employee stock plans	—	(1)	—	—	—	(1)	—	(1)
Issuance of $0.01 par value common stock under employee stock plans	—	3	(3)	—	—	—	—	—
Stock-based compensation expense	—	—	19	—	—	19	—	19
Cash dividends ($1.20 per share)	—	—	—	(280)	—	(280)	—	(280)
Issuance of noncontrolling interest in CF Industries Nitrogen, LLC (CFN)	—	—	—	—	—	—	2,792	2,792
Distributions declared to noncontrolling interests	—	—	—	—	—	—	(119)	(119)
Balance as of December 31, 2016	$2	$(1)	$1,380	$2,365	$(398)	$3,348	$3,144	$6,492
Net earnings	—	—	—	358	—	358	92	450
Other comprehensive income	—	—	—	—	135	135	—	135
Issuance of $0.01 par value common stock under employee stock plans	—	1	—	—	—	1	—	1
Stock-based compensation expense	—	—	17	—	—	17	—	17
Cash dividends ($1.20 per share)	—	—	—	(280)	—	(280)	—	(280)
Distributions declared to noncontrolling interests.	—	—	—	—	—	—	(131)	(131)
Balance as of December 31, 2017	$2	$—	$1,397	$2,443	$(263)	$3,579	$3,105	$6,684
Adoption of ASU No. 2016-01	—	—	—	1	(1)	—	—	—
Adoption of ASU No. 2014-09	—	—	—	(1)	—	(1)	—	(1)
Adoption of ASU No. 2018-02	—	—	—	10	(10)	—	—	—
Net earnings	—	—	—	290	—	290	138	428
Other comprehensive loss	—	—	—	—	(97)	(97)	—	(97)
Purchases of treasury stock	—	(500)	—	—	—	(500)	—	(500)
Issuance of $0.01 par value common stock under employee stock plans	—	(4)	12	—	—	8	—	8
Stock-based compensation expense	—	—	21	—	—	21	—	21
Cash dividends ($1.20 per share)	—	—	—	(280)	—	(280)	—	(280)
Acquisition of noncontrolling interests in TNCLP	—	—	(62)	—	—	(62)	(331)	(393)
	—	—	—	—	—	—	(139)	(139)

Distributions declared to noncontrolling interests								
Balance as of December 31, 2018	$2	$ (504)	$1,368	$2,463	$ (371)	$ 2,958	$ 2,773	$5,731

See Accompanying Notes to Consolidated Financial Statements.

CF INDUSTRIES HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year ended December 31,		
	2018	2017	2016
	(in millions)		
Operating Activities:			
Net earnings (loss)	$428	$450	$(158)
Adjustments to reconcile net earnings (loss) to net cash provided by operating activities:			
Depreciation and amortization	888	883	678
Deferred income taxes	78	(601)	739
Stock-based compensation expense	22	17	19
Unrealized net (gain) loss on natural gas derivatives	(13)	61	(260)
Loss on embedded derivative	1	4	23
Impairment of equity method investment in PLNL	—	—	134
Gain on sale of equity method investment	—	(14)	—
Loss on debt extinguishment	—	53	167
Loss on disposal of property, plant and equipment	6	3	10
Undistributed (earnings) losses of affiliates—net of taxes	(3)	3	9
Changes in:			
Accounts receivable—net	68	(57)	18
Inventories	(52)	40	(7)
Accrued and prepaid income taxes	8	809	(676)
Accounts payable and accrued expenses	44	(1)	(18)
Customer advances	59	48	(120)
Other—net	(37)	(67)	59
Net cash provided by operating activities	1,497	1,631	617
Investing Activities:			
Additions to property, plant and equipment	(422)	(473)	(2,211)
Proceeds from sale of property, plant and equipment	26	20	14
Proceeds from sale of equity method investment	—	16	—
Proceeds from sale of auction rate securities	—	9	—
Distributions received from unconsolidated affiliates	10	14	—
Insurance proceeds	10	—	—
Other—net	1	1	2
Net cash used in investing activities	(375)	(413)	(2,195)
Financing Activities:			
Proceeds from long-term borrowings	—	—	1,244
Payments of long-term borrowings	—	(1,148)	(1,170)
Proceeds from short-term borrowings	—	—	150
Payments of short-term borrowings	—	—	(150)
Payment to CHS related to credit provision	(5)	(5)	(5)
Financing fees	1	(1)	(31)
Purchases of treasury stock	(467)	—	—
Dividends paid on common stock	(280)	(280)	(280)
Issuance of noncontrolling interest in CFN	—	—	2,800

Acquisition of noncontrolling interests in TNCLP	(388)	—	—
Distributions to noncontrolling interests	(139)	(131)	(119)
Issuances of common stock under employee stock plans	12	1	—
Shares withheld for taxes	(4)	—	—
Net cash (used in) provided by financing activities	(1,270)	(1,564)	2,439
Effect of exchange rate changes on cash and cash equivalents	(5)	12	(1)
(Decrease) increase in cash, cash equivalents and restricted cash	(153)	(334)	860
Cash, cash equivalents and restricted cash at beginning of period	835	1,169	309
Cash, cash equivalents and restricted cash at end of period	$682	$835	$1,169

See Accompanying Notes to Consolidated Financial Statements.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Background and Basis of Presentation

We are a leading global fertilizer and chemical company. Our 3,000 employees operate world-class manufacturing complexes in Canada, the United Kingdom and the United States. Our principal customers are cooperatives, independent fertilizer distributors, traders, wholesalers, farmers and industrial users. Our principal nitrogen fertilizer products are ammonia, granular urea, urea ammonium nitrate solution (UAN) and ammonium nitrate (AN). Our other nitrogen products include diesel exhaust fluid (DEF), urea liquor, nitric acid and aqua ammonia, which are sold primarily to our industrial customers, and compound fertilizer products (NPKs), which are solid granular fertilizer products for which the nutrient content is a combination of nitrogen, phosphorus and potassium. We serve our customers in North America through our production, storage, transportation and distribution network. We also reach a global customer base with exports from our Donaldsonville, Louisiana, plant, the world’s largest and most flexible nitrogen complex. Additionally, we move product to international destinations from our Verdigris, Oklahoma, facility, our Yazoo City, Mississippi, facility and our Billingham and Ince facilities in the United Kingdom, and a joint venture ammonia facility in the Republic of Trinidad and Tobago in which we own a 50 percent interest.

All references to “CF Holdings,” “the Company,” “we,” “us” and “our” refer to CF Industries Holdings, Inc. and its subsidiaries, except where the context makes clear that the reference is only to CF Industries Holdings, Inc. itself and not its subsidiaries. All references to “CF Industries” refer to CF Industries, Inc., a 100% owned subsidiary of CF Industries Holdings, Inc.

Our principal assets include:

- five U.S. nitrogen fertilizer manufacturing facilities located in: Donaldsonville, Louisiana; Port Neal, Iowa; Yazoo City, Mississippi; Verdigris, Oklahoma; and Woodward, Oklahoma. These facilities are owned directly or indirectly by CF Industries Nitrogen, LLC (CFN), of which we own approximately 89% and CHS Inc. (CHS), owns the remainder. See Note 17—Noncontrolling Interests for additional information on our strategic venture with CHS;
- two Canadian nitrogen fertilizer manufacturing facilities, located in Medicine Hat, Alberta and Courtright, Ontario;
- two United Kingdom nitrogen manufacturing facilities, located in Billingham and Ince;
- an extensive system of terminals and associated transportation equipment located primarily in the Midwestern United States; and
- a 50% interest in Point Lisas Nitrogen Limited (PLNL), an ammonia production joint venture located in the Republic of Trinidad and Tobago that we account for under the equity method.

During the first quarter of 2018, we adopted Accounting Standards Update (ASU) No. 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash. As a result, in our consolidated statements of cash flows for the years ended December 31, 2017 and 2016, we have reclassified $5 million and $18 million, respectively, of withdrawals from restricted cash funds, previously classified as cash provided by investing activities, to be included in the reconciliation of the beginning and ending balances of cash, cash equivalents and restricted cash. See Note 3—New Accounting Standards for additional information.

During the first quarter of 2018, we adopted ASU No. 2017-07, Compensation—Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost. As a result, we reclassified certain amounts in our consolidated statements of operations for the years ended December 31, 2017 and 2016. See Note 3—New Accounting Standards for additional information.

2. Summary of Significant Accounting Policies

Consolidation and Noncontrolling Interests

The consolidated financial statements of CF Holdings include the accounts of CF Industries and all majority-owned subsidiaries. All significant intercompany transactions and balances have been eliminated.

In 2018, we announced that Terra Nitrogen GP Inc. (TNGP), the sole general partner of Terra Nitrogen Company, L.P. (TNCLP) and an indirect wholly owned subsidiary of CF Holdings, elected to exercise its right to purchase all of the 4,612,562 publicly traded common units of TNCLP (the TNCLP Public Units). TNGP completed its purchase of the TNCLP Public Units on April 2, 2018, for an aggregate cash purchase price of $388 million. Upon completion of the Purchase, we owned, through our subsidiaries, 100% of the general and limited partnership interests of TNCLP. Prior to the purchase of the TNCLP Public Units, we owned approximately 75.3% of TNCLP through general and limited partnership interests and outside investors owned the remaining approximately 24.7% of the limited partnership, and we consolidated TNCLP into our financial statements. The outside investors' limited partnership interests in the partnership were included in noncontrolling interests in our consolidated financial statements prior to our purchase of the TNCLP Public Units.

On February 1, 2016, CHS made a capital contribution to CFN, a subsidiary of CF Holdings, in exchange for membership interests in CFN, which represented approximately 11% of the total membership interests of CFN. We own the remaining approximately 89% of CFN and consolidate CFN in our financial statements. CHS' minority equity interest in CFN is included in noncontrolling interests in our consolidated financial statements, and represents CHS' membership interests in CFN.

See Note 17—Noncontrolling Interests for additional information.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States (U.S. GAAP) requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses for the periods presented. Significant estimates and assumptions are used for, but are not limited to, net realizable value of inventories, environmental remediation liabilities, environmental and litigation contingencies, the cost of customer incentives, useful lives of property and identifiable intangible assets, the evaluation of potential impairments of property, investments, identifiable intangible assets and goodwill, income taxes, allowances for doubtful accounts receivable, the determination of the funded status and annual expense of defined benefit pension and other postretirement plans and the valuation of stock-based compensation awards granted to employees.

Revenue Recognition

We follow a five-step model for revenue recognition. The five steps are: (1) identification of the contract(s) with the customer, (2) identification of the performance obligation(s) in the contract(s), (3) determination of the transaction price, (4) allocation of the transaction price to the performance obligation, and (5) recognition of revenue when (or as) the performance obligation is satisfied. We have fulfilled our performance obligations when control transfers to the customer, which occurs at the later of when title or risk of loss transfers to the customer, which is generally upon loading of our product onto transportation equipment or delivery to a customer destination. Revenue from forward sales programs is recognized on the same basis as other sales regardless of when the customer advances are received. In situations where we have agreed to arrange delivery of the product to the customer's intended destination and control of the product transfers upon loading of our product, we have elected to account for freight income associated with the delivery of these products as freight revenue. Shipping and handling costs incurred by us are included in cost of sales.

We offer cash incentives to certain customers based on the volume of their purchases over a certain period. Customer incentives are reported as a reduction in net sales.

Cash and Cash Equivalents

Cash and cash equivalents include highly liquid investments that are readily convertible to known amounts of cash with original maturities of three months or less. The carrying value of cash and cash equivalents approximates fair value.

Investments

Short-term investments and noncurrent investments are accounted for primarily as available-for-sale securities reported at fair value. Prior to January 1, 2018, changes in fair value for available-for-sale debt and equity securities were reported in other comprehensive income. In 2018, as a result of our adoption of ASU No. 2016-01 on January 1, 2018, changes in the fair value of available-for-sale equity securities are recognized through earnings. The carrying values of short-term investments approximate fair values because of the short maturities and the highly liquid nature of these investments.

Accounts Receivable and Allowance for Doubtful Accounts

Accounts receivable includes trade receivables and non-trade receivables. Accounts receivable are recorded at face amounts less an allowance for doubtful accounts. The allowance is an estimate based on historical collection experience, current economic and market conditions, and a review of the current status of each customer's trade accounts receivable. A receivable is past due if payments have not been received within the agreed-upon invoice terms. Account balances are charged-off against the allowance when management determines that it is probable that the receivable will not be recovered.

Inventories

Inventories are reported at the lower of cost and net realizable value with cost determined on a first-in, first-out and average cost basis. Inventory includes the cost of materials, production labor and production overhead. Inventory at warehouses and terminals also includes distribution costs to move inventory to the distribution facilities. Net realizable value is reviewed at least quarterly. Fixed production costs related to idle capacity are not included in the cost of inventory but are charged directly to cost of sales in the period incurred.

Investment in Unconsolidated Affiliate

The equity method of accounting is used for investments in affiliates that we do not consolidate, but over which we have the ability to exercise significant influence. Our equity method investment for which the results are included in operating earnings consists of our 50% ownership interest in PLNL, which operates an ammonia production facility in the Republic of Trinidad and Tobago. Our share of the net earnings from this investment is reported as an element of earnings from operations because PLNL's operations provide additional production and are integrated with our supply chain and sales activities in the ammonia segment. See Note 8—Equity Method Investments for additional information. Profits resulting from sales or purchases with equity method investees are eliminated until realized by the investee or investor, respectively. Investments in affiliates are reviewed for impairment whenever events or circumstances indicate that the carrying value may not be recoverable. When circumstances indicate that the fair value of an investment in an affiliate is less than its carrying value, and the reduction in value is other than temporary, the reduction in value is recognized immediately in earnings.

Property, Plant and Equipment

Property, plant and equipment are stated at cost. Depreciation and amortization are computed using the straight-line method and are recorded over the estimated useful life of the property, plant and equipment. Useful lives are as follows:

	Years
Mobile and office equipment	3 to 10
Production facilities and related assets	2 to 30
Land improvements	10 to 30
Buildings	10 to 40

We periodically review the useful lives assigned to our property, plant and equipment and we change the estimates to reflect the results of those reviews.

Scheduled inspections, replacements and overhauls of plant machinery and equipment at our continuous process manufacturing facilities during a full plant shutdown are referred to as plant turnarounds. Plant turnarounds are accounted for under the deferral method, as opposed to the direct expense or built-in overhaul methods. Under the deferral method, expenditures related to turnarounds are capitalized in property, plant and equipment when incurred and amortized to production costs on a straight-line basis over the period benefited, which is until the next scheduled turnaround in up to five years. If the direct expense method were used, all turnaround costs would be expensed as incurred. Internal employee costs and overhead amounts are not considered turnaround costs and are not capitalized. Turnaround costs are classified as investing activities in our consolidated statements of cash flows. See Note 6—Property, Plant and Equipment—Net for additional information.

Recoverability of Long-Lived Assets

We review property, plant and equipment and other long-lived assets in order to assess recoverability based on expected future undiscounted cash flows whenever events or circumstances indicate that the carrying value may not be recoverable. If the sum of the expected future net cash flows is less than the carrying value, an impairment loss is recognized. The impairment loss is measured as the amount by which the carrying value exceeds the fair value of the asset.

Goodwill and Other Intangible Assets

Goodwill represents the excess of the purchase price of an acquired entity over the amounts assigned to the assets acquired and liabilities assumed. Goodwill is not amortized, but is reviewed for impairment annually or more frequently if certain impairment conditions arise. We perform our annual goodwill impairment review in the fourth quarter of each year at the reporting unit level. Our evaluation can begin with a qualitative assessment of the factors that could impact the significant inputs used to estimate fair value. If after performing the qualitative assessment, we determine that it is not more likely than not that the fair value of a reporting unit is less than its carrying amount, including goodwill, then no further analysis is necessary. However, if the results of the qualitative test are unclear, we perform a quantitative test, which involves comparing the fair value of a reporting unit with its carrying amount, including goodwill. We use an income-based valuation method, determining the present value of future cash flows, to estimate the fair value of a reporting unit. If the fair value of a reporting unit exceeds its positive carrying amount, goodwill of the reporting unit is considered not impaired, and no further analysis is necessary. If the fair value of the reporting unit is less than its carrying amount, goodwill impairment would be recognized equal to the amount of the carrying value in excess of the reporting unit's fair value, limited to the total amount of goodwill allocated to the reporting unit.

Our intangible assets are presented in other assets on our consolidated balance sheets. See Note 7—Goodwill and Other Intangible Assets for additional information regarding our goodwill and other intangible assets.

Leases

Leases may be classified as either operating leases or capital leases. Assets acquired under capital leases, if any, would be depreciated on the same basis as property, plant and equipment. For operating leases, rental payments, including rent holidays, leasehold incentives, and scheduled rent increases are expensed on a straight-line basis. Leasehold improvements are amortized over the shorter of the depreciable lives of the corresponding fixed assets or the lease term including any applicable renewals.

Income Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those differences are projected to be recovered or settled. Realization of deferred tax assets is dependent on our ability to generate sufficient taxable income of an appropriate character in future periods. A valuation allowance is established if it is determined to be more likely than not that a deferred tax asset will not be realized. Significant judgment is applied in evaluating the need for and magnitude of appropriate valuation allowances against deferred tax assets. Interest and penalties related to unrecognized tax benefits are reported as interest expense and income tax expense, respectively.

Historically, a deferred income tax liability was recorded for income taxes that would result from the repatriation of the portion of the investment in the Company's non-U.S. subsidiaries and joint venture that were considered to not be permanently reinvested. No deferred income tax liability was recorded for the remainder of our investment in non-U.S. subsidiaries and joint venture, which we believed to be permanently reinvested. We record our tax expense for Global Intangible Low-Taxed Income (GILTI) as an expense in the period in which incurred and as such do not record a deferred tax liability for taxes that may be due in future periods. See Note 10—Income Taxes for additional information.

Customer Advances

Customer advances represent cash received from customers following acceptance of orders under our forward sales programs. Under such advances, the customer prepays a portion of the value of the sales contract prior to obtaining control of the product, thereby reducing or eliminating accounts receivable from customers. Revenue is recognized when the customer obtains control of the product.

Derivative Financial Instruments

Natural gas is the principal raw material used to produce nitrogen-based products. We manage the risk of changes in natural gas prices primarily through the use of derivative financial instruments. The derivative instruments that we may use are primarily natural gas fixed price swaps, natural gas basis swaps and natural gas options traded in the over-the-counter (OTC) markets. The derivatives reference primarily a NYMEX futures price index, which represent the basis for fair value at any given time. These derivatives are traded in months forward and settlements are scheduled to coincide with anticipated gas purchases during those future periods. We do not use derivatives for trading purposes and are not a party to any leveraged derivatives.

Derivative financial instruments are accounted for at fair value and recognized as current or noncurrent assets and liabilities on our consolidated balance sheets. We use natural gas derivatives as an economic hedge of natural gas price risk, but without the application of hedge accounting. As a result, changes in fair value of these contracts are recognized in earnings. The fair values of derivative instruments and any related cash collateral are reported on a gross basis rather than on a net basis. Cash flows related to natural gas derivatives are reported as operating activities. See Note 15—Derivative Financial Instruments for additional information.

Debt Issuance Costs

Costs associated with the issuance of debt are recorded on the balance sheet as a direct deduction from the carrying amount of the related debt liability. Costs associated with entering into revolving credit facilities are recorded as an asset in noncurrent assets. All debt issuance costs are amortized over the term of the related debt using the effective interest rate method. Debt issuance discounts are netted against the related debt and are amortized over the term of the debt using the effective interest method. See Note 12—Financing Agreements for additional information.

Environmental

Environmental expenditures that relate to current operations are expensed or capitalized as appropriate. Expenditures that relate to an existing condition caused by past operations are expensed. Expenditures that increase the capacity or extend the useful life of an asset, improve the safety or efficiency of the operations, or mitigate or prevent future environmental contamination are capitalized. Liabilities are recorded when it is probable that an obligation has been incurred and the costs can be reasonably estimated. Environmental liabilities are not discounted.

Stock-based Compensation

We grant stock-based compensation awards under our equity and incentive plans. The awards that have been granted to date are nonqualified stock options, restricted stock awards, restricted stock units and performance share units. The cost of employee services received in exchange for the awards is measured based on the fair value of the award on the grant date and is recognized as expense on a straight-line basis over the period during which the employee is required to provide the services. See Note 19—Stock-Based Compensation for additional information.

Treasury Stock

We periodically retire treasury shares acquired through repurchases of our common stock and return those shares to the status of authorized but unissued. We account for treasury stock transactions under the cost method. For each reacquisition of common stock, the number of shares and the acquisition price for those shares is added to the treasury stock count and total value. When treasury shares are retired, we allocate the excess of the repurchase price over the par value of shares acquired to both retained earnings and paid-in capital. The portion allocated to paid-in capital is determined by applying the average paid-in capital per share, and the remaining portion is recorded to retained earnings.

Litigation

From time to time, we are subject to ordinary, routine legal proceedings related to the usual conduct of our business. We may also be involved in proceedings regarding public utility and transportation rates, environmental matters, taxes and permits relating to the operations of our various plants and facilities. Accruals for such contingencies are recorded to the extent management concludes their occurrence is probable and the financial impact of an adverse outcome is reasonably estimable. Legal fees are recognized as incurred and are not included in accruals for contingencies. Disclosure for specific legal contingencies is provided if the likelihood of occurrence is at least reasonably possible and the exposure is considered material to the consolidated financial statements.

In making determinations of likely outcomes of litigation matters, many factors are considered. These factors include, but are not limited to, history, scientific and other evidence, and the specifics and status of each matter. If the assessment of various factors changes, the estimates may change. Predicting the outcome of claims and litigation, and estimating related costs and exposure involves substantial uncertainties that could cause actual costs to vary materially from estimates and accruals.

Foreign Currency Translation

We translate the financial statements of our foreign subsidiaries with non-U.S. dollar functional currencies using period-end exchange rates for assets and liabilities and weighted-average exchange rates for each period for revenues and expenses. The resulting translation adjustments are recorded as a separate component of accumulated other comprehensive income (AOCI) within stockholders' equity.

Foreign currency-denominated assets and liabilities are remeasured into U.S. dollars at exchange rates existing at the respective balance sheet dates. Gains and losses resulting from these foreign currency transactions are included in other operating—net on our consolidated statements of operations. Gains and losses resulting from intercompany foreign currency transactions that are of a long-term investment nature, if any, are reported in other comprehensive income.

3. New Accounting Standards

Recently Adopted Pronouncements

On January 1, 2018, we adopted ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606), which supersedes the revenue recognition requirements in Accounting Standards Codification (ASC) Topic 605, Revenue Recognition. This ASU is based on the principle that revenue is recognized to depict the transfer of goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. This ASU also requires additional disclosure about the nature, amount, timing, and uncertainty of revenue and cash flows arising from customer contracts, including significant judgments. Additionally, the costs to obtain and fulfill a contract, including assets to be recognized, are to be capitalized and such capitalized costs should be disclosed. In 2016, the Financial Accounting Standards Board (FASB) issued additional ASUs that enhanced the operability of the principal versus agent guidance in ASU No. 2014-09 by clarifying that an entity should consider the nature of each good or service promised to a customer at the individual good or service level, clarified that ASU No. 2014-09 should not be applied to immaterial performance obligations, and enhanced the guidance around the treatment of shipping costs incurred to fulfill performance obligations. Our adoption of this ASU, utilizing the modified retrospective approach on contracts that were not completed as of January 1, 2018, resulted in a reduction to opening retained earnings of $1 million related to the cumulative difference between ASC Topic 605 and ASC Topic 606. See Note 4—Revenue Recognition for additional information.

On January 1, 2018, we adopted ASU No. 2016-01, Financial Instruments—Overall (Subtopic 825-10) Recognition and Measurement of Financial Assets and Financial Liabilities, which changes the income statement impact of equity investments held by an entity. The amendments require the unrealized gains or unrealized losses of equity instruments measured at fair value to be recognized in net income. Our adoption of this ASU resulted in an increase to opening retained earnings of $1 million representing the cumulative effect of unrealized gains from equity securities from AOCI.

On January 1, 2018, we adopted ASU No. 2016-18, Statement of Cash Flows (Topic 230) Restricted Cash - a consensus of the FASB Emerging Issues Task Force, which requires that the statement of cash flows include amounts described as restricted cash and restricted cash equivalents as part of cash and cash equivalents when reconciling the beginning and ending period balances. Upon adoption of this ASU, $5 million and $18 million of withdrawals from restricted cash funds previously reflected as cash provided by investing activities for the years ended December 31, 2017 and 2016, respectively, and our restricted cash balances of $5 million and $23 million as of December 31, 2016 and 2015, respectively, were reclassified to be included within the reconciliation of beginning and ending cash, cash equivalents and restricted cash balances on our consolidated statements of cash flows for the years ended December 31, 2017 and 2016, respectively.

On January 1, 2018, we adopted ASU No. 2017-07, Compensation—Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost, which changed the presentation of net benefit cost related to employer sponsored defined benefit plans and other postretirement benefits. Only service cost can be included within the same income statement line item as other compensation costs arising from services rendered during the period, while other components of net benefit cost must be presented separately outside of operating income. Additionally, only service costs may be capitalized on the balance sheet. Our adoption of this ASU was applied retrospectively for the income statement classification requirements and prospectively for the capitalization guidance, which resulted in net benefit cost previously recognized in cost of sales and selling, general and administrative expenses to be reclassified to other non-operating—net on our consolidated statement of operations for the years ended December 31, 2017 and 2016, as follows:

	Year ended December 31,					
	2017			2016		
	As Reported	Adjustment	As Adjusted	As Reported	Adjustment	As Adjusted
	(in millions)					
Cost of sales	$3,700	$ (4)	$ 3,696	$2,845	$ (3)	$ 2,842
Gross margin	430	4	434	840	3	843
Selling, general and administrative expenses	192	(1)	191	174	(1)	173
Operating earnings	229	5	234	134	4	138
Other non-operating (income) expense—net	(2)	5	3	(2)	4	2

On January 1, 2018, we adopted ASU No. 2016-16, Income Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory, which requires an entity to recognize the income tax consequences of an intra-entity transfer of an asset other than inventory when the transfer occurs. Our adoption of this ASU had no impact on our consolidated financial statements.

In the third quarter of 2018, we adopted ASU No. 2017-04, Intangibles—Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. This ASU simplifies the accounting for goodwill impairment by removing Step 2 of the goodwill impairment test. Step 2 required entities to calculate the implied fair value of goodwill in the same manner as the amount of goodwill recognized in a business combination by assigning the fair value of a reporting unit to all of the assets and liabilities of the reporting unit. Under Step 2, the carrying value in excess of the implied fair value would be recognized as goodwill impairment. Under this new ASU, goodwill impairment is recognized equal to the amount of the carrying value in excess of the reporting unit's fair value, limited to the total amount of goodwill allocated to the reporting unit. Our adoption of this ASU had no impact on our consolidated financial statements.

In the fourth quarter of 2018, we adopted ASU No. 2018-02, Income Statement—Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income. This ASU allows a reclassification from AOCI to retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act. As a result of our adoption of this ASU, we reclassified $10 million of stranded tax effects previously recognized in AOCI to retained earnings during the fourth quarter of 2018. See Note 10—Income Taxes and Note 18—Stockholders' Equity for additional information.

In the fourth quarter of 2018, we adopted ASU No. 2018-14, Compensation—Retirement Benefits—Defined Benefit Plans—General (Topic 715-20): Disclosure Framework—Changes to the Disclosure Requirements for Defined Benefit Plans. This ASU modifies the disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans and must be applied retrospectively. The modified disclosure requirements of this ASU are reflected in Note 11—Pension and Other Postretirement Benefits.

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Recently Issued Pronouncements

In February 2016, the FASB issued ASU No. 2016-02, Leases (Topic 842), which supersedes the lease accounting requirements in ASC Topic 840, Leases. This ASU will require lessees to recognize the rights and obligations resulting from virtually all leases (other than leases that meet the definition of a short-term lease) on their balance sheets as right-of-use assets with corresponding lease liabilities. Extensive quantitative and qualitative disclosures, including significant judgments made by management, will be required to provide greater insight into the extent of income and expense recognized and expected to be recognized from existing contracts. This ASU is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018, with early adoption permitted, and requires the modified retrospective method of adoption. In July 2018, the FASB issued ASU No. 2018-11, Leases (Topic 842): Targeted Improvements, which provides the option to initially apply ASU No. 2016-02 at the adoption date with a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption, instead of applying the new guidance retrospectively for each prior reporting period presented. We plan to elect the optional transition method within ASU No. 2018-11. We believe the most significant change of the adoption of these ASUs on our consolidated financial statements relates to the recognition of the right-of-use assets and lease liabilities on our balance sheet for operating leases for certain property and equipment, including transportation equipment utilized for the distribution of our products. We estimate that the right-of-use asset and lease liability that we will recognize on our consolidated balance sheet upon adoption on January 1, 2019 will be approximately $300 million. See Note 24—Leases for additional information.

In August 2017, the FASB issued ASU No. 2017-12, Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities, which improves the financial reporting of hedging relationships in order to better portray the economic results of an entity's risk management activities in its financial statements. The amendments are effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018, and should be applied to existing hedging relationships as of the date of adoption. Early adoption of this ASU is permitted. We do not expect the adoption of this ASU will have a material effect on our consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-15, Intangibles—Goodwill and Other—Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That is a Service Contract. This ASU aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. The amendments in this ASU are effective for annual and interim periods beginning after December 15, 2019 and can be applied either retrospectively or prospectively to all implementation costs incurred after the date of adoption. Early adoption is permitted. We are currently evaluating the impact that our adoption of this ASU will have on our consolidated financial statements.

4. Revenue Recognition

Prior to the adoption of ASC 606, under ASC 605, the basic criteria necessary for revenue recognition were: (1) evidence that a sales arrangement existed, (2) delivery of goods had occurred, (3) the seller's price to the buyer was fixed or determinable, and (4) collectability was reasonably assured. We recognized revenue when these criteria had been met, and when title and risk of loss transferred to the customer, which could be at the plant gate, a distribution facility, a supplier location or a customer destination.

We adopted ASC 606 on January 1, 2018. The revenue that we recognize, both prior to and after the adoption of ASC 606, arises from contracts we have with our customers. Our performance obligations under a contract correspond to each shipment of product that we make to our customer under the contract; as a result, each contract may have more than one performance obligation based on the number of products ordered, the quantity of product to be shipped and the mode of shipment requested by the customer. Control of our products transfers to our customers when the customer is able to direct the use of, and obtain substantially all of the benefits from, our products, which generally occurs at the later of when the customer obtains title to our product or when the customer assumes risk of loss of our product. The transfer of control generally occurs at a point in time upon loading of our product onto transportation equipment or upon delivery to the customer’s intended destination. Once this occurs, we have satisfied our performance obligation and we recognize revenue.

When we enter into a contract with a customer, we are obligated to provide the product in that contract during a mutually agreed upon time period. Depending on the terms of the contract, either we or the customer arranges delivery of the product to the customer’s intended destination. In situations where we have agreed to arrange delivery of the product to the customer’s intended destination and control of the product transfers upon loading of our product onto transportation equipment, we have elected to account for any freight income associated with the delivery of these products as freight revenue, consistent with our treatment of this income prior to the adoption of ASC 606, since this activity fulfills our obligation to transfer the product to the customer. For 2018, the total amount of freight recognized as revenue was not material.

Certain of our contracts require us to supply products on a continuous basis to the customer. We recognize revenue on these contracts based on the quantity of products transferred to the customer during the period. For 2018, the total amount of revenue for these contracts was $85 million.

From time to time, we will enter the marketplace to purchase product in order to satisfy the obligations of our customer contracts. When we purchase product for this purpose, we are the principal in the transaction and recognize revenue on a gross basis. As discussed in Note 8—Equity Method Investments, we have transactions in the normal course of business with PLNL, reflecting our obligation to purchase 50% of the ammonia produced by PLNL at current market prices. During 2018, other than products purchased from PLNL, we did not purchase any products in the marketplace in order to satisfy the obligations of our customer contracts.

Transaction Price

We agree with our customers on the selling price of each transaction. This transaction price is generally based on the product, market conditions, including supply and demand balances, freight arrangements including where control transfers, and customer incentives. In our contracts with customers, we allocate the entire transaction price to the sale of product to the customer, which is the basis for the determination of the relative standalone selling price allocated to each performance obligation. Returns of our product by our customers are permitted only when the product is not to specification. Returns were not material during 2018. Any sales tax, value added tax, and other tax we collect concurrently with our revenue-producing activities are excluded from revenue.

We offer cash incentives to certain customers based on the volume of their purchases over a certain period. These incentives do not provide an option to the customer for additional product. Customer incentives are reported as a reduction in net sales. Accrual of these incentives involves the use of estimates, including how much product the customer will purchase and whether the customer will achieve a certain level of purchases within the incentive period. The balances of customer incentives accrued at December 31, 2018 and 2017 were not material.

If we had continued to apply legacy revenue recognition guidance for 2018, our net sales, gross margin, and net income attributable to common shareholders would not have been materially different. See Note 3—New Accounting Standards for the impact of our adoption of ASU No. 2014-09.

Revenue Disaggregation

We track our revenue by product and by geography. See Note 21—Segment Disclosures for our revenue by reportable segment, which are ammonia, granular urea, UAN, AN and Other.

The following table summarizes our revenue by product and by geography (based on destination of our shipment) for 2018:

	Ammonia	Granular Urea	UAN	AN	Other	Total
	(in millions)					
Year ended December 31, 2018						