LyondellBasell Industries N.V.
Form 10-K
February 16, 2016
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UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-K

(Mark One)

þ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended December 31, 2015

OR

¨ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the transition period from to

Commission file number: 001-34726

LyondellBasell Industries N.V.

(Exact name of registrant as specified in its charter)

The Netherlands	**98-0646235**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**

1221 McKinney St., Suite 300 Houston, Texas USA 77010	**4th Floor, One Vine Street London W1J0AH The United Kingdom**	**Delftseplein 27E 3013 AA Rotterdam The Netherlands**

(Address of principal executive offices) (Zip Code)

(713) 309-7200 **+44 (0) 207 220 2600** **+31 (0)10 275 5500**
(Registrant s telephone numbers, including area codes)

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

Title of Each Class	Name of Each Exchange On Which Registered
Ordinary Shares, 0.04 Par Value	**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. þ Yes ¨ No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. ¨ Yes þ No

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate website, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). þ Yes ¨ No

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

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

Large accelerated filer þ	Accelerated filer ¨
Non-accelerated filer ¨ (Do not check if a smaller reporting company)	Smaller reporting company ¨

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

The aggregate market value of common stock held by non-affiliates of the registrant on June 30, 2015, the last business day of the registrant s most recently completed second fiscal quarter, based on the closing price on that date of $103.52, was $41.8 billion. For purposes of this disclosure, in addition to the registrant s executive officers and members of its Supervisory Board, the registrant has included Access Industries, LLC and its affiliates as affiliates.

The registrant had 432,200,532 shares outstanding at February 11, 2016 (excluding 146,234,738 treasury shares).

Documents incorporated by reference:

Portions of the Notice of the 2016 Annual General Meeting of Shareholders and 2016 Proxy Statement, in connection with the Company s 2016 Annual General Meeting of Shareholders (in Part III), as indicated herein.

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CAUTIONARY STATEMENT FOR THE PURPOSES OF THE SAFE HARBOR PROVISIONS OF THE PRIVATE SECURITIES LITIGATION REFORM ACT OF 1995

This report includes forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934 (the Exchange Act). You can identify our forward-looking statements by the words anticipate, estimate, believe, continue, could, intend, may, plan, potential, predict, should, will, expect, objective, projection, forecast, target and similar expressions.

We based the forward-looking statements on our current expectations, estimates and projections about ourselves and the industries in which we operate in general. We caution you that these statements are not guarantees of future performance as they involve assumptions about future events that, while made in good faith, may prove to be incorrect, and involve risks and uncertainties we cannot predict. Accordingly, our actual outcomes and results may differ materially from what we have expressed or forecast in the forward-looking statements. Any differences could result from a variety of factors, including the following:

- the cost of raw materials represents a substantial portion of our operating expenses, and energy costs generally follow price trends of crude oil, natural gas liquids and/or natural gas; price volatility can significantly affect our results of operations and we may be unable to pass raw material and energy cost increases on to our customers due to the significant competition that we face, the commodity nature of our products and the time required to implement pricing changes;

- our U.S. operations have benefited from low-cost natural gas and natural gas liquids; decreased availability of these materials (for example, from their export or regulations impacting hydraulic fracturing in the U.S.) could reduce the current benefits we receive;

- if crude oil prices continue to fall materially, or continue to decrease relative to U.S. natural gas prices, we would see less benefit from low-cost natural gas and natural gas liquids and it could have a negative effect on our results of operations;

- industry production capacities and operating rates may lead to periods of oversupply and low profitability; for example, there has been substantial capacity expansions announced in the U.S. olefins industry;

- we may face unplanned operating interruptions (including leaks, explosions, fires, weather-related incidents, mechanical failures, unscheduled downtime, supplier disruptions, labor shortages, strikes, work stoppages or other labor difficulties, transportation interruptions, spills and releases and other environmental incidents) at any of our facilities, which would negatively impact our operating results; for example, because the Houston refinery is our only refining operation, we would not have the ability to increase production elsewhere to mitigate the impact of any outage at that facility;

- regulations may negatively impact our business by, among other things, restricting our operations, increasing costs of operations or requiring significant capital expenditures;

- we may not be able to protect our market position or otherwise pass on cost increases to our customers due to the significant competition we face as a result of the commodity nature of many of our products;

- changes in general economic, business, political and regulatory conditions in the countries or regions in which we operate could increase our costs, restrict our operations and reduce our operating results;

our ability to implement business strategies and execute our organic growth plans may be negatively affected or restricted by, among other things, our ability to complete projects on time and on budget and other events that may affect our ability to execute projects and strategies;

uncertainties associated with worldwide economies could create reductions in demand and pricing, as well as increased counterparty risks, which could reduce liquidity or cause financial losses resulting from counterparty default;

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- the negative outcome of any legal, tax and environmental proceedings or changes in laws or regulations regarding legal, tax and environmental matters may increase our costs or otherwise limit our ability to achieve savings under current regulations;

- any loss or non-renewal of favorable tax treatment under agreements or treaties, or changes in laws, regulations or treaties, may substantially increase our tax liabilities;

- we may be required to reduce production or idle certain facilities because of the cyclical and volatile nature of the supply-demand balance in the chemical and refining industries, which would negatively affect our operating results;

- we rely on continuing technological innovation, and an inability to protect our technology, or others technological developments could negatively impact our competitive position;

- we have significant international operations, and continued economic uncertainties, fluctuations in exchange rates, valuations of currencies and our possible inability to access cash from operations in certain jurisdictions on a tax-efficient basis, if at all, could negatively affect our liquidity and our results of operations;

- we are subject to the risks of doing business at a global level, including wars, terrorist activities, political and economic instability and disruptions and changes in governmental policies, which could cause increased expenses, decreased demand or prices for our products and/or disruptions in operations, all of which could reduce our operating results;

- if we are unable to comply with the terms of our credit facilities, indebtedness and other financing arrangements, those obligations could be accelerated, which we may not be able to repay; and

- we may be unable to incur additional indebtedness or obtain financing on terms that we deem acceptable, including for refinancing of our current obligations; higher interest rates and costs of financing would increase our expenses.

Any of these factors, or a combination of these factors, could materially affect our future results of operations and the ultimate accuracy of the forward-looking statements. These forward-looking statements are not guarantees of future performance, and our actual results and future developments may differ materially from those projected in the forward-looking statements. Our management cautions against putting undue reliance on forward-looking statements or projecting any future results based on such statements or present or prior earnings levels.

All subsequent written and oral forward-looking statements attributable to us or any person acting on our behalf are expressly qualified in their entirety by the cautionary statements contained or referred to in this section and any other cautionary statements that may accompany such forward-looking statements. Except as otherwise required by applicable law, we disclaim any duty to update any forward-looking statements. Additional factors that could cause results to differ materially from those described in the forward-looking statements can be found in the Risk Factors section of this report on page 22.

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PART I

Items 1 and 2. Business and Properties

OVERVIEW

LyondellBasell Industries N.V. is a global, independent chemical company and was incorporated under Dutch law on October 15, 2009. Unless otherwise indicated, the Company, we, our, us and LyondellBasell are used in this report to refer to the businesses of LyondellBasell Industr N.V. and its consolidated subsidiaries. We are one of the world s top five independent chemical companies based on revenues.

We participate globally across the petrochemical value chain and are an industry leader in many of our product lines. Our chemicals businesses consist primarily of large processing plants that convert large volumes of liquid and gaseous hydrocarbon feedstocks into plastic resins and other chemicals. Our chemical products tend to be basic building blocks for other chemicals and plastics, while our plastic products are typically used in large volume applications. Our customers use our plastics and chemicals to manufacture a wide range of products that people use in their everyday lives including food packaging, home furnishings, automotive components, paints and coatings. Our refining business consists of our Houston refinery, which processes crude oil into products such as gasoline, diesel and jet fuel.

Our financial performance is influenced in general by the supply and demand for the products that we produce, the cost and availability of feedstocks, global and regional competitor capacity, our operational efficiency and our ability to control costs. We have a strong operational focus and, as a producer of large volume commodities, continuously strive to differentiate ourselves through safe, reliable and low-cost operations in all our businesses. During recent years the cost of natural gas-derived raw materials in the U.S. versus the global cost of crude oil-derived raw materials has had a significant positive influence on the profitability of our North American operations. While the North American feedstock advantage declined with lower oil prices in 2015, improved product supply and demand fundamentals in several businesses, notably global polyolefins products, more than offset the decline. To a lesser extent, our differentiated assets and technology also positively influence our performance as compared to our peers and competitors. These include our propylene oxide and polypropylene technologies; flexible feedstock olefins plants in the U.S.; joint venture olefins and polyolefins plants with access to low-cost feedstock, particularly in Saudi Arabia; and our Houston refinery, which is capable of processing heavy, high-sulfur crude.

SEGMENTS

We manage our operations through five operating segments. Our reportable segments are:

Olefins and Polyolefins Americas (O&P Americas). Our O&P Americas segment produces and markets olefins, including ethylene and ethylene co-products, and polyolefins.

Olefins and Polyolefins Europe, Asia, International (O&P EAI). Our O&P EAI segment produces and markets olefins, including ethylene and ethylene co-products, polyolefins and specialty products, including polybutene-1 and polypropylene compounds.

Intermediates and Derivatives (I&D). Our I&D segment produces and markets propylene oxide and its co-products, including isobutylene and styrene monomer, and derivatives, acetyls including methanol, ethylene oxide and its derivatives, ethanol and oxygenated fuels, or oxyfuels.

Refining. Our Refining segment refines heavy, high-sulfur crude oil and other crude oils of varied types and sources available on the U.S. Gulf Coast into fuel products including gasoline and distillates (diesel and jet fuels).

Technology. Our Technology segment develops and licenses chemical and polyolefin process technologies and manufactures and sells polyolefin catalysts.

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We regularly review our segments and the approach used by management to evaluate performance and resource allocation. At the beginning of 2014, management began using EBITDA (earnings before interest, taxes and depreciation and amortization) as the primary measure for reviewing our segments profitability. Our comparisons to the prior periods presented were revised to reflect this change.

Financial information about our business segments and geographical areas can be found in Note 22, *Segment and Related Information*, to the Consolidated Financial Statements. Information about the locations where we produce our primary products can be found under Description of Properties.

In 2015, 2014 and 2013, no single customer accounted for 10% or more of our total revenues.

Olefins and Polyolefins Segments Generally

We are one of the leading worldwide producers of olefins, including ethylene and propylene, and polyethylene (PE). We are the world s largest producer of polypropylene (PP) and PP compounds. We manage our olefin and polyolefin business in two reportable segments, O&P Americas and O&P EAI.

Olefins Ethylene is the most significant petrochemical in terms of worldwide production volume and is the key building block for PE and a large number of other chemicals, plastics and synthetics. The production of ethylene results in co-products such as aromatics and other olefins, including propylene and butadiene. Ethylene and its co-products are fundamental to many parts of the economy, including the production of consumer products, packaging, housing and automotive components and other durable and nondurable goods. In 2015, we completed an expansion project at our Channelview, Texas facility that added 250 million pounds to our annual ethylene capacity, and we further benefited from an 800 million pound per year expansion of our La Porte, Texas ethylene facility that was completed in 2014.

Polyolefins Polyolefins are thermoplastics and comprise approximately two-thirds of worldwide thermoplastics demand. Since their industrial commercialization, thermoplastics have been used in wide-ranging applications and products that improve safety and comfort and enhance the everyday quality of life. Our products are used in consumer, automotive and industrial applications ranging from food and beverage packaging to housewares and construction materials. We produce high density polyethylene (HDPE), low density polyethylene (LDPE) and linear low density polyethylene (LLDPE). We also produce PP homopolymers, PP impact copolymers and PP random copolymers. We produce and market several specialty product lines, including PP compounds, *Catalloy* process resins and polybutene-1 (PB-1), focusing on unique polyolefins and compounds that offer a wide range of performance characteristics. Typical properties of such specialty polyolefins and compounds include impact-stiffness balance, scratch resistance, soft touch and heat sealability. End uses include automotive and industrial products and materials. PP compounds are produced from blends of polyolefins and additives and are sold mainly to the automotive and home appliances industries. The *Catalloy* process is proprietary technology that is not licensed to third parties. As a result, we are the only manufacturer of *Catalloy* process resins, which are used primarily in roofing, packaging and automotive applications. PB-1 is a family of butane-based polymers and is mainly used in pipe applications and under-floor heating systems and sanitary water heating systems.

PE sales, including HDPE, LDPE and LLDPE, accounted for approximately 21%, 18% and 17% of our total revenues in 2015, 2014 and 2013, respectively. In 2014, we completed an expansion project at our Matagorda plant in Texas, which added 220 million pounds of HDPE production. PP sales, including *Catalloy*, accounted for approximately 17%, 16% and 16% of our total revenues in 2015, 2014 and 2013, respectively.

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The following table outlines the primary products of our O&P segments, annual processing capacity as of December 31, 2015, and the primary uses for those products. Capacities, which are presented in pounds unless otherwise indicated, include 100% of the capacity of our joint venture facilities. The joint ventures proportional share of capacity is shown in the footnote to the table, below.

Product	Annual Capacity(1)			Primary Uses
	Americas	EAI	Total	
Olefins:				
Ethylene	10.9 billion	6.5 billion	17.4 billion	Ethylene is used as a raw material to manufacture polyethylene, ethylene oxide, ethanol, ethylene dichloride, styrene, vinyl acetate monomer (VAM) and other products.
Propylene	5.5 billion	6.0 billion	11.5 billion	Propylene is used to produce PP, acrylonitrile, propylene oxide (PO) and other products.
Butadiene	1.1 billion	670 million	1.7 billion	Butadiene is used to manufacture styrene-butadiene rubber and polybutadiene rubber, which are used in the manufacture of tires, hoses, gaskets and other rubber products. Butadiene is also used in the production of paints, adhesives, nylon clothing, carpets, paper coatings and engineered plastics.
Polyolefins:				
HDPE	3.6 billion	4.2 billion	7.8 billion	HDPE is used to manufacture grocery, merchandise and trash bags; food containers for items from frozen desserts to margarine; plastic caps and closures; liners for boxes of cereal and crackers; plastic drink cups and toys; dairy crates; bread trays; pails for items from paint to fresh fruits and vegetables; safety equipment, such as hard hats; house wrap for insulation; bottles for household and industrial chemicals and motor oil; milk, water, and juice bottles; large tanks for storing liquids such as agricultural and lawn care chemicals; and pipe.
LDPE	1.3 billion	2.8 billion	4.1 billion	LDPE is used to manufacture food packaging films; plastic bottles for packaging food and personal care items; dry cleaning bags; ice bags; pallet shrink wrap; heavy-duty bags for mulch and potting soil; boil-in-bags; coatings on flexible packaging products; and coatings on paper board such as milk cartons.

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Product	Annual Capacity(1)			Primary Uses
	Americas	EAI	Total	
LLDPE	1.3 billion		1.3 billion	LLDPE is used to manufacture garbage and lawn-leaf bags; industrial can liners; housewares; lids for coffee cans and margarine tubs; dishpans, home plastic storage containers, and kitchen trash containers; large toys like outdoor gym sets; drip irrigation tubing; insulating resins and compounds used to insulate copper and fiber optic wiring; shrink wrap for multi-packaging canned food, bag-in-box bags, produce bags, and pallet stretch wrap.
PP	4.4 billion	12.6 billion	17.0 billion	PP is primarily used to manufacture fibers for carpets, rugs and upholstery; housewares; medical products; automotive interior trim, fascia, running boards, battery cases, and bumpers; toys and sporting goods; fishing tackle boxes; and bottle caps and closures.
Specialty Polyolefins:				
PP compounds		2.8 billion	2.8 billion	PP compounds are used to manufacture automotive interior and exterior trims, dashboards, bumpers and under-hood applications; base material for products and parts used in appliances; anti-corrosion coatings for steel piping, wire and cable.
Catalloy process resins	600 million	600 million	1.2 billion	*Catalloy* process resins are used primarily in modifying polymer properties in film applications and molded products; for specialty films, geomembrane liners, and roofing materials; in bitumen modification for roofing and asphalt applications; and for automotive bumpers.
PB-1 resins		110 million	110 million	PB-1 resins are used in flexible pipes, resins for seal-peel film, film modification, hot melt applications, consumer packaging and adhesives.
Aromatics:				
Benzene (in gallons)	195 million		195 million	Benzene is used to produce styrene, phenol and cyclohexane. These products are used in the production of nylon, plastics, synthetic rubber and polystyrene. Polystyrene is used in insulation, packaging and drink cups.

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(1) Represents total annual nameplate capacity, which includes approximately 1,650 million pounds of ethylene; approximately 2,500 million pounds of propylene; approximately 1,010 million pounds of HDPE; approximately 780 million pounds of LDPE; approximately 670 million pounds (O&P Americas) and 4,960 million pounds (O&P EAI) of PP; and approximately 200 million pounds of PP compounds of nameplate capacity owned by third parties either through joint venture arrangements or other contractual relationships. In some situations, the Company and the third parties may have access to the other s capacity through certain arrangements.

Olefins and Polyolefins Americas Segment

Overview

Our O&P Americas segment produces and markets olefins, polyolefins, aromatics, specialty products and ethylene co-products. In addition, we produce specialty products including *Catalloy* and *Plexar* resins.

Sales & Marketing / Customers

Our ethylene production is consumed internally as a raw material in the production of polymers and other derivatives, with the balance sold to third party customers under multi-year contracts or on a spot basis. In 2015 we completed a 250 million pound per year expansion at our Channelview, Texas facility, following an 800 million pound per year expansion of our La Porte, Texas facility completed in mid-2014. We have also announced ethylene expansion projects for our Corpus Christi, Texas facility in 2016.

We are a net purchaser of propylene, a raw material used in the production of PO, PP and other derivatives. Our butadiene production is sold to the external market under multi-year contracts. All of our benzene production is used as a raw material in the production of styrene by our I&D segment.

In addition to purchases of propylene, at times we purchase ethylene and butadiene for resale, when necessary, to satisfy customer demand above our own production levels. Volumes of any of these products purchased for resale can vary significantly from period to period. However, purchased volumes have not historically had a significant impact on profits.

In the U.S., most of the ethylene and propylene production of our Channelview, Corpus Christi and La Porte, Texas facilities is shipped via a pipeline system, which has connections to numerous U.S. Gulf Coast consumers. This pipeline extends from Corpus Christi to Mont Belvieu, Texas. In addition, exchange agreements with other ethylene and co-products producers allow access to customers who are not directly connected to this pipeline system. Some ethylene is shipped by rail car from Clinton, Iowa to Morris, Illinois and some is shipped directly to customers. A pipeline owned and operated by an unrelated party is used to transport ethylene from Morris, Illinois to Tuscola, Illinois where it is used as a raw material in the production of ethanol. Some propylene is shipped by ocean going vessel. Butadiene, benzene, toluene and other products are distributed by pipeline, rail car, truck, barge or ocean going vessel.

Our PP and PE production is typically sold through our sales organization to an extensive base of established customers and distributors servicing both the domestic and export markets either under annual contracts or on a spot basis. We have regional sales offices in various locations in North America and our polyolefins primarily are transported in North America by railcar or truck. Export sales are generally to customers in Central and South America. We also sell PP to our PP compounds business, which is managed worldwide by our O&P EAI segment.

Joint Venture Relationships

We participate in a joint venture arrangement in Mexico, which provides us with capacity for approximately 640 million pounds of PP production. The capacity is based on our percentage ownership of the joint ventures total capacity. We do not hold a majority interest in or have operational control of this joint venture.

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Raw Materials

Raw material cost is the largest component of the total cost for the production of ethylene and its co-products. The primary raw materials that can be used in our Americas olefin facilities are heavy liquids and natural gas liquids (NGLs). Heavy liquids include crude oil-based naphtha and other refined products, as well as domestically sourced condensate, a very light crude oil resulting from natural gas production (collectively referred to as heavy liquids). NGLs include ethane, propane and butane. The use of heavy liquid raw materials results in the production of a significant amount of co-products such as propylene, butadiene and benzene, as well as gasoline blending components, while the use of NGLs results in the production of a smaller amount of co-products.

Our ability to pass through raw material price increases to our customers is dependent upon market-driven demand for olefins and polyolefins. Sales prices for products sold in the spot market are determined by market forces. Our contract prices are influenced by spot prices, indices published in industry publications and cost recovery formulas in the contracts.

Prior to 2010, facilities using heavy liquids as feedstock usually generated higher margins than those using NGLs. However, in recent years NGLs, particularly in the United States, have had a significant cost advantage over heavy liquids due to technological advances for extracting shale gas which have led to an increased supply of NGLs. This cost advantage was lower in 2015 than in prior years, but was still significant. A plant s flexibility to consume a wide range of raw materials generally will provide an advantage over plants that are restricted in their processing capabilities. Our Americas facilities can process significant quantities of either heavy liquids or NGLs. We estimate that in the U.S. we can produce up to approximately 90% of our total ethylene output using NGLs. Changes in the raw material feedstock utilized in the production process will result in variances in production capacities among products. We believe our raw material flexibility in the U.S. is a key advantage in our production of ethylene and its co-products.

In North America, we also purchase large amounts of natural gas that is used primarily as an energy source in our business and as the primary feedstock for methanol production by our I&D segment. The purchases are generally market-based contractual arrangements with multiple suppliers.

Industry Dynamics / Competition

With respect to olefins and polyolefins, competition is based on price, product quality, product delivery, reliability of supply, product performance and customer service. Industry consolidation in North America has led to fewer, although larger, competitors. Profitability is affected not only by supply and demand for olefins and polyolefins, but also by raw material costs and price competition among producers, which may intensify due to, among other things, the addition of new capacity. In general, demand is a function of worldwide economic growth, including the regional dynamics that underlie global growth trends.

We compete in North America with other large marketers and producers, including global chemical companies, chemical divisions of large oil companies and regional marketers and producers.

Based on published data, we believe we were, as of December 31, 2015:

- the second largest producer of ethylene in North America, with ethylene rated capacity of 10.9 billion pounds per year, or approximately 14% of total North American ethylene production capacity;
- the third largest producer of PE in North America with 6.2 billion pounds per year of capacity, or approximately 14% of North American capacity; and
- the largest producer of PP in North America, including our share of our Indelpro joint venture capacity, with 3.3 billion pounds, or approximately 18% of the North American capacity.

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Olefins and Polyolefins Europe, Asia, International Segment

Overview

Our O&P EAI segment produces and markets olefins, including ethylene and ethylene co-products, and polyolefins. In addition, we produce significant quantities of specialty products such as *Catalloy* process resins and PB-1. Our O&P EAI segment manages our worldwide PP compound business (including our PP compounds facilities in North and South America), our worldwide PB-1 business, and our *Catalloy* process resins produced in Europe.

Sales & Marketing / Customers

Our ethylene production is primarily consumed internally as a raw material in the production of polymers and we purchase additional ethylene to meet our production needs. Our propylene production is used as a raw material in the production of PO and PP, and we purchase propylene because our internal needs exceed our internal production. European ethylene production is generally fully integrated with our downstream facilities in Europe.

We produce and sell butadiene to external customers under multi-year contracts and on a spot basis.

With respect to PP and PE, our production is typically sold through our sales organization to an extensive base of established customers under annual contracts or on a spot basis and is also sold through distributors. Our polyolefins are transported in Europe primarily by railcar or truck. We believe that, over a business cycle, average sales prices and profit margins for specialty polymers tend to be higher than average sales prices and profit margins for higher-volume commodity polyolefins or polymers.

Our regional sales offices are in various locations, including The Netherlands, Hong Kong, China, India, Australia and the United Arab Emirates. We also operate through a worldwide network of local sales and representative offices in Europe, Asia and Africa. Our joint ventures described below typically manage their domestic sales and marketing efforts independently, and we typically operate as their agent/distributor for all or a portion of their exports.

Joint Venture Relationships

We participate in several manufacturing joint ventures in Saudi Arabia, Thailand, Poland, Australia, Japan and South Korea. We do not hold majority interests in any of these joint ventures, nor do we have operational control. These ventures provide us with additional production capacity of approximately 2,630 million pounds of PP, approximately 810 million pounds of propylene, approximately 550 million pounds of ethylene, approximately 570 million pounds of HDPE, approximately 340 million pounds of LDPE and approximately 160 million pounds of PP compounds. These capacities are based on our percentage ownership interest in the joint ventures total capacities. We realize profits or losses from these ventures as income (or loss) on the equity basis of accounting.

We generally license our polyolefin process technologies and supply catalysts to our joint ventures through our Technology segment. Some of our joint ventures are able to source cost advantaged raw materials from their local shareholders.

Raw Materials

Raw material cost is the largest component of the total cost for the production of ethylene and its co-products. The primary raw materials used in our European olefin facilities are naphtha streams, which are heavier than NGLs; however, in recent years we have sourced increased amounts of advantaged NGLs when the opportunity arises. For our Saudi joint venture facilities, locally sourced and cost advantaged NGLs, including

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ethane, propane and butane are used. The principal raw materials used by our polyolefin and *Catalloy* process resin businesses are propylene and ethylene. In Europe, we have the capacity to produce approximately 50% of the propylene requirements of our European PP business and all of the ethylene requirements of our European PE business. Propylene and ethylene requirements that are not produced internally are generally acquired pursuant to long-term contracts with third party suppliers or via spot purchases.

Our PP compounds facilities generally receive their PP and other polymer raw materials from one of our wholly owned or joint venture facilities. PB-1 raw materials are sourced solely from external supply. Some of our joint ventures receive propylene and ethylene from their local shareholders under long-term contracts.

Our ability to pass through the increased cost of raw materials to customers is dependent on global market demand for olefins and polyolefins. In general, the pricing for purchases and sales of most products is determined by global market forces, including the impacts of foreign exchange on the pricing of the underlying heavy liquid raw materials, most of which are priced in U.S. dollars. There can be a lag between observed naphtha raw material price changes in a given month and contract product price changes that were settled prior to the beginning of that month. In such cases, volatility in our product margins may occur.

Industry Dynamics / Competition

With respect to olefins and polyolefins, competition is based on price, product quality, product delivery, reliability of supply, product performance and customer service. We compete with regional and multinational chemical companies and divisions of large oil companies. The petrochemical market in the European Union (EU) has been affected by the price volatility of naphtha, the primary feedstock for olefins in the region, as well as fluctuating demand as a result of uncertain European and global economic conditions.

Based on published data and including our proportionate share of our joint ventures, we believe we were, as of December 31, 2015:

- the fifth largest producer of ethylene in Europe with an ethylene rated capacity in Europe of 4.3 billion pounds per year, or approximately 8% of total European ethylene capacity;
- the largest producer of PP in Europe with 5.2 billion pounds per year of capacity, or approximately 22% of European PP capacity;
- the largest producer of PE in Europe with 4.8 billion pounds per year of capacity, or approximately 22% of HDPE and 13% of LDPE European capacity; and
- the largest PP compounds producer in the world with 2.6 billion pounds per year of capacity, with approximately 51% of that capacity in Europe, 21% in North America, and 27% in the rest of the world.

Intermediates and Derivatives Segment

Overview

Our I&D segment produces and markets PO and its co-products and derivatives; acetyls including methanol, ethylene oxide (EO) and its derivatives; ethanol; and oxyfuels (methyl tertiary butyl ether (MTBE) and ethyl tertiary butyl ether (ETBE)). PO co-products include styrene monomer (SM) and tertiary butyl alcohol (TBA), most of which is used to make oxyfuels, isobutylene and tertiary butyl hydro peroxide (TBHP). TBA and its products other than oxyfuels are sometimes referred to as C4 chemicals. PO derivatives include propylene glycol (PG), propylene glycol ethers (PGE) and butanediol (BDO). We believe that our proprietary PO and acetyls production process technologies provide us with a cost advantaged position for these products and their derivatives.

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We produce PO through two distinct technologies, one of which yields TBA as the co-product and the other of which yields SM as the co-product. The two technologies are mutually exclusive, meaning that a manufacturing facility must be dedicated to either PO/TBA or to PO/SM.

The following table outlines the primary products, annual capacities, and primary uses for the I&D segment s products. Capacities, which are presented in pounds unless otherwise indicated, include 100% of the capacity of joint venture facilities. The joint ventures proportional share of capacity is shown in the footnote to the table, below.

Product	Annual Capacity(1)	Primary Uses
Propylene Oxide	5.1 billion	PO is a key component of polyols, PG, PGE and BDO.
PO Co-Products:		
Styrene Monomer	5.9 billion	SM is used to produce plastics, such as expandable polystyrene for packaging, foam cups and containers, insulation products and durables and engineering resins.
Tertiary Butyl Alcohol	6.1 billion	TBA is a precursor to isobutylene, MTBE and ETBE. Isobutylene is used in the manufacture of synthetic rubber and lubricant additives as well as gasoline blending components. MTBE and ETBE are high octane gasoline blending components; ETBE incorporates agriculturally produced ethanol.
PO Derivatives:		
Propylene Glycol	1.0 billion	PG is used to produce unsaturated polyester resins for bathroom fixtures and boat hulls; antifreeze, coolants and aircraft deicers; and cosmetics and cleaners.
Propylene Glycol Ethers	540 million	PGE are used as solvents for paints, coatings, cleaners and a variety of electronics applications.
Butanediol	465 million	BDO is used in the manufacture of engineering resins, films, personal care products, pharmaceuticals, coatings, solvents and adhesives.
Acetyls:		
Methanol (in gallons)	480 million	Methanol is a raw material used to produce acetic acid, MTBE, formaldehyde and several other products, including adhesives, foams, plywood subfloors, solvents and windshield washer fluid.
Acetic Acid	1.2 billion	Acetic acid is a raw material used to produce VAM, terephthalic acid (used to produce polyester for textiles and plastic bottles), industrial solvents and a variety of other chemicals.
Vinyl Acetate Monomer	700	