Ingevity Corp
Form 10-K
February 20, 2019

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

FORM 10-K

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x 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 001-37586

INGEVITY CORPORATION
(Exact name of registrant as specified in its charter)

Delaware	47-4027764
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

5255 Virginia Avenue
North Charleston, South Carolina 29406
(Address of principal executive offices) (Zip code)
843-740-2300
(Registrant’s telephone number)
Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class:	Name of Each Exchange on Which Registered:
Common Stock ($0.01 par value)	New York Stock Exchange

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

	Yes	No
Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.	x	o
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 of Section 15(d) of the Act.	..	x
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.	x	..
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 registrant was required to submit such files.)	x	..
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K of any amendment to this Form 10-K.	x	

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 definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company,” and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one)
Large Accelerated Filer x Accelerated Filer o

Non-Accelerated Filer o Smaller reporting company o
Emerging growth 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 by Rule 12b-2 of the Exchange Act). Yes o No x

At June 30, 2018, the aggregate market value of common stock held by non-affiliates of the Registrant was $3,395,178,951. The market value held by non-affiliates excludes the value of those shares held by executive officers and directors of the Registrant.

The Registrant had 41,618,887 shares of common stock, $0.01 par value, outstanding at February 19, 2019.

Documents Incorporated by Reference	
Portions of the Company's definitive 2019 Annual Meeting Proxy Statement are incorporated by reference into Part III of this report.	

Ingevity Corporation
Form 10-K
INDEX

PART I

Item 1. Business

General

Ingevity's business originated as part of the operations of its initial parent company, Westvaco Corporation, a paper and packaging company, using co-products of the kraft pulping process, primarily crude tall oil ("CTO"), and lignin, as well as hardwood sawdust from lumber manufacturing. Ingevity operated as a division of Westvaco Corporation and its corporate successors, including MeadWestvaco Corporation and WestRock Company, since 1964.

On May 15, 2016, we completed the separation of Ingevity from WestRock Company ("WestRock") (herein referred to as the "Separation"). The Separation was completed by way of a distribution of all of the then outstanding shares of common stock of Ingevity through a dividend in kind of Ingevity's common stock (par value $0.01) to holders of record of WestRock common stock (par value $0.01) as of the close of business on May 4, 2016 (the "Record Date"). Ingevity's common stock began "regular-way" trading on the New York Stock Exchange ("NYSE") on May 16, 2016 under the symbol "NGVT."

Ingevity Corporation was incorporated in Delaware on March 27, 2015. The address of Ingevity's principal executive offices is 5255 Virginia Avenue, North Charleston, South Carolina 29406. Ingevity maintains a website at www.ingevity.com. Ingevity's website and the information contained in or connected to the website will not be deemed to be incorporated in this document.

Throughout this Annual Report on Form 10-K, except where otherwise stated or indicated by the context, "Ingevity", the "Company", "we", "us", or "our" means Ingevity Corporation and its consolidated subsidiaries and their predecessors. Copies of the annual, quarterly, and current reports we file with the Securities and Exchange Commission ("SEC"), and any amendments to those reports, are available on our website at www.ingevity.com as soon as practicable after we furnish such materials to the SEC. Apart from SEC filings, we also use our website to publish information, which may be important to investors, such as presentations to analysts. Reports filed with the SEC may be viewed at www.sec.gov.

Ingevity

Ingevity is a leading global manufacturer of specialty chemicals and high performance activated carbon materials. We provide innovative solutions to meet our customers' unique and demanding requirements through proprietary formulated products. We report in two business segments, Performance Materials and Performance Chemicals.

Our Performance Materials segment consists of our automotive technologies and process purifications product lines. Performance Materials manufactures products in the form of powder, granular, extruded pellets, extruded honeycombs, and activated carbon sheets. Automotive technologies products are sold into gasoline vapor emission control applications within the automotive industry, while process purification products are sold into the food, water, beverage, and chemical purification industries.

Our Performance Chemicals segment consists of our pavement technologies, oilfield technologies, industrial specialties, and engineered polymers product lines. Performance Chemicals manufactures products derived from CTO and lignin extracted from the kraft paper making process as well as caprolactone monomers and derivatives derived from cyclohexanone and hydrogen peroxide. Performance Chemicals products serve as critical inputs used in a variety of high performance applications, including pavement preservation, pavement adhesion promotion, and warm mix paving (pavement technologies product line), oil well service additives, oil production, and downstream application chemicals (oilfield technologies product line), printing inks, adhesives, agrochemicals, lubricants, and industrial intermediates (industrial specialties product line), coatings, resins, elastomers, adhesives, and bio-plastics (engineered polymers product line).

Our global engineering, technical, sales, and application support teams closely collaborate with our customers, and, importantly, with their customers. With our deep technical expertise and experience in our customers' applications and end markets, we have the capacity and flexibility to anticipate and respond to changing market conditions and customer demands and to develop proactive solutions that provide our customers, and therefore us, with a distinct competitive advantage. Additionally, the quality and diversity of our product portfolio, and the flexibility of our

manufacturing assets, gives us the capability to direct our resources towards their most profitable and attractive uses and geographies in response to changing market conditions.

The charts below illustrate our revenue by segment, product line and geography in 2018 for all product lines except

engineered polymers, which was acquired on February 13, 2019. For more information about the Caprolactone acquisition, see Note 17, and for more information on our U.S. and foreign operations, see Notes 5 and 20, to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K.

	Performance Materials	Performance Chemicals			
Product Lines	Carbon Technologies	Pavement Technologies	Oilfield Technologies	Industrial Specialties	Engineered Polymers
Primary End Uses	Automotive gasoline vapor emissions control Process purification	Pavement preservation Adhesion promotion Warm mix asphalt technology	Well service additives Production and downstream chemicals	Adhesives Agrochemicals Lubricants Publication inks Industrial intermediates	Coatings Resins Elastomers Adhesives Bio-plastics
Revenue	$400.4 million	$733.2 million			

Sales are assigned to geographic areas based on location to which product was shipped to a third-party.

Our Core Strengths

Ingevity is committed to continued value creation by focusing on its core strengths:

Leading Global Market Positions

We are a leader in the global pine chemicals industry, further distinguished by our focus on target markets that offer the potential for profitable growth, supported by long-term secular growth trends such as infrastructure preservation and development, innovation in unconventional oil drilling and production, and increasing global food production demands. Our products serve as critical inputs used in a variety of high performance applications, including pavement preservation, pavement adhesion promotion, warm mix asphalt, oil well service additives, oil production, downstream applications chemicals, printing inks, adhesives, agrochemicals, and lubricants. The quality and diversity of our product portfolio, and the flexibility of our manufacturing assets, gives us the capability to direct our differentiated products towards their most profitable and attractive uses and geographies.

We are the global leader in caprolactone technologies, as shown by our invested capital base that represents approximately 60 percent of the global manufacturing capacity. Caprolactone is a critical input to many high-growth end-use applications such as thermoplastic additives for biodegradables and polyols in coatings, as well as other coatings, resins, elastomers, adhesives, and bioplastics. Our manufacturing footprint allows us to both produce caprolactone monomer as well as derivatize it into the more profitable and faster growing market segments and geographies.

We are the leading global manufacturer of activated carbon used in gasoline vapor emission control systems in cars, trucks, motorcycles, and boats. This business is expected to benefit from increasingly stringent vehicle emission standards worldwide that our products are designed and qualified to meet. The annual global sales of light duty vehicles (i.e., passenger and light commercial vehicles) that are powered with gasoline are forecasted to grow from approximately 76 million to approximately 92 million vehicles, an increase of 21 percent from 2017 to 2027. Most of this growth is expected to occur outside of the U.S., Canada, and China in countries and regions where gasoline vapor emission standards significantly lag the new modern, highly effective standards that are currently being implemented in the U.S., Canada, and China. This provides significant upside potential in addition to the already favorable macroeconomic growth trends of the global automotive industry.

Flexible Manufacturing Capabilities Optimize Asset Utilization

The quality and diversity of our product portfolio, and the flexibility of our manufacturing assets, gives us the capability to direct our resources to their most profitable uses and geographies. Our Performance Materials assets, which primarily produce automotive grade carbon, are also capable of producing a number of other activated carbon products for food, water, beverage, and chemical purification applications, maximizing the productivity of these assets.

Our Performance Chemical assets include multipurpose chemical reactors that are capable of manufacturing products of varying chemistries that can serve multiple markets. For example, in our South Carolina facility, the newest reactor that was commissioned in 2015 is capable of producing products for pavement, oilfield, and adhesives applications, while our Louisiana assets can be redirected with relative ease among various applications including printing inks, adhesives, oilfield, and asphalt. In our Warrington facility, we have reactors for thermoplastic and polyol applications. Both of those sets of reactors can produce products for a variety of applications: adhesives, bioplastics, and medical devices in thermoplastics and adhesives, coatings, and elastomers in polyols.

Deep Technical Expertise and Product Innovation Capability and Experience

We have deep technical expertise and market knowledge and insights, derived from customer relationships and research and development capabilities, that enable our ability to innovate. Innovation efforts are led and supported by our teams of technical experts and industry veterans, many of whom are considered the foremost experts in their fields, spread throughout our organization in key positions from product development to manufacturing to sales. Each of our business units has its own development and application laboratories that work in partnership with our customers to refine existing products and develop new innovative products that will drive value for Ingevity and our customers. With our technical expertise and product innovation capability and experience, and by working closely with our customers, our technical experts offer application solutions that address our customers' most difficult challenges. For example, when our road contractor customers vary the aggregate and/or asphalt to be used in a particular job mix, they call on our expertise to quickly reformulate the Ingevity additive chemistry needed for the revised mix, so that they can meet the original job specifications on time, regardless of the change. Our ability to swiftly understand and address our customers' performance needs allows Ingevity to maintain and grow its partnerships with its customer base.

Unique Decades-Long Track Record of Automotive Carbon Products Meeting Emission Compliance Standards

Current U.S. Federal, California, and Canadian regulatory standards and the China 6 national standard, promulgated in December 2016, require that gasoline vapor control devices remain effective for the entire life of the vehicles on which they are installed. Ingevity has a substantial, decades-long track record of providing life-of-vehicle product performance in a properly designed gasoline vapor control system. Our capability to engineer very specific mesoporous carbons on a large commercial scale allows the system designers to minimize the system's size based on our carbon's ability to remain highly effective over a vehicle's lifetime. Given the imperative for automotive manufacturers to produce vehicles capable of meeting these long-term requirements, or potentially face expensive recalls and unfavorable publicity, there is a potential risk to use the products of other producers who do not have a comparable, proven history and technical capability, particularly given the significant costs associated with non-compliance should a product fail to maintain its effectiveness over a vehicle's lifetime.

Global Manufacturing and Supply Chain Reach

We have a global reach that allows us to effectively service multinational customers through a combination of our manufacturing facilities located in the U.S., China, and the United Kingdom as well as local talent strategically placed around the globe. In addition, our technology centers located in the U.S., China, the United Kingdom, Europe, and India give us the ability to service our customers throughout these regions, and provide us with market insights that allow us to develop customized solutions for local and regional markets. Our global engineering, technical, sales, and application support teams serve customers in approximately 75 countries.

This capability also allows us to take advantage of future market trends. For example, our global reach allows us to pursue growth opportunities in oil and gas producing regions outside of the U.S., particularly in the Middle East.

Collaborative Customer and End User Relationships Drive Profitable Growth Opportunities

We take a partnership approach with our customers, investing resources to deeply understand their customers' needs so that we can provide technologically advanced, tailored solutions that allow our customers to maintain a competitive advantage in the markets they serve. Our knowledge of our customers' end markets provides us with insights that enable us to develop solutions that address opportunities or challenges and create value for our customers. For example, through our relationships with several automobile Original Equipment Manufacturers, or "OEMs" (often, our customers' customer), we learned that certain vehicles were having trouble passing emissions certification tests based on a small amount of volatile organic compounds ("VOCs") migrating from the engine via the vehicles' air intake systems. To address this issue, we developed several generations of activated carbon-based solutions, including activated carbon extruded honeycombs and engineered activated carbon sheets, that manage these emissions while minimizing pressure drop in the air intake system-a key performance advantage to the OEMs. This drove demand for our product by addressing the needs of our customers' customer. We believe this approach-driving demand for our products by developing solutions for our customers' end markets-has been, and will continue to be, a significant driver of profitable growth.

Education of Government and Regulatory Bodies on Scientifically Based Policies and Specifications

Many of our customers are subject to increasing regulatory standards and mandates. For example, more stringent air quality standards drive reductions in automotive emissions or the use of recycled materials in the case of pavement technologies. With our technical expertise and experience, our teams are a valued resource and work directly with government and regulatory bodies, in support of our customers, as experts in their field to educate regulators about existing and innovative technologies that support their objectives or solve specific challenges. As the trend continues in mature and emerging markets towards more advanced solutions, we believe the ability to leverage our expertise to educate, advocate and promote sensible regulatory solutions will benefit our customers while driving incremental value within those markets. For example, Ingevity has globally recognized expertise in the highly specialized field of automotive gasoline vapor emissions. While tailpipe emissions on vehicles are well recognized, understood and regulated, gasoline vapor emissions from vehicles have been lightly regulated in many countries outside the U.S., Canada, Brazil, and China. Our experts have educated authorities in other countries to help them understand and quantify the magnitude of these emissions and evaluate the highly effective solutions currently being adopted in the U.S., Canada, and China that can significantly reduce these gasoline vapor emissions at a relatively low cost per vehicle.

Our engagement with regulators allows us to then work with our customers in order to help them respond and adapt to evolving and varying regulatory standards. For example, because of the stringent and differing regulatory compliance standards applicable to the global oilfield industry, our oilfield customers often turn to us instead of smaller, less sophisticated suppliers in order to help them manage the complexities of compliance risk in chemical distribution and use throughout the world.

Highly Engaged, Performance and Safety-Driven Culture

We have assembled a highly talented, collaborative, committed, and creative team which drives the success of our business. Our collective ambition is keenly focused on creating value for today and tomorrow. Further, we are committed to protecting human health and the environment while using resources in a responsible and sustainable manner. As a long-standing member of the American Chemistry Council ("ACC"), we subscribe to the Guiding Principles of the Responsible Care program-a global chemical industry performance initiative that is implemented in the U.S. through the ACC. Our ISO 9001, IATF 16949 and Responsible Care Certifications are internationally recognized measures of consistent superior performance and responsibility to health, safety, security, and the environment.

Long-term Secured Raw Material Supply

Of relevance to our Performance Chemicals segment, at the time of the Separation, we entered into a long-term supply agreement with WestRock pursuant to which we purchase all of the CTO output from WestRock's existing (at the time of separation) kraft mills, subject to certain exceptions. In 2018, we entered into a 20-year supply agreement with Georgia-Pacific LLC ("Georgia-Pacific"), pursuant to which we purchase the lesser of 125,000 tons of CTO and the

aggregate output of CTO produced and originating at certain of Georgia-Pacific’s paper mills.

These relationships with WestRock and Georgia-Pacific are strategically important to our Performance Chemicals business due to the limited supply of CTO globally, of which we believe a significant portion is already under long-term supply agreements with other consumers of CTO. Under these agreements, we currently expect to source approximately 60 to 70 percent of our CTO requirements through 2025 based on the maximum operating rates of our three Performance Chemicals' pine chemicals facilities.

We believe this supply from Georgia-Pacific, WestRock, and with our other contracted sources of CTO, will allow us to serve expected customer demand.

Our Plans for Additional Growth

We have a demonstrated history of profitable growth. Looking ahead, we believe we will continue to deliver profitable growth by taking the following steps:

Expand Sales to Existing Customers and into New Geographies

We believe we are well positioned to organically expand our sales through a combination of continued global market growth, leveraging our significant application knowledge to apply our existing products to new applications and capitalizing on the investments we have made in our global manufacturing, sales, technical centers, and distribution network. Our global reach allows us to effectively compete in new geographies, delivering proven innovative solutions where opportunities to apply our technologies exist. We continue to leverage our significant application knowledge and intimate customer relationships to target opportunities where we know our products perform and to create demand for our products by driving value for our customers.

We intend to continue to strengthen our position in emerging markets where there are significant opportunities for growth. Opportunities include the expansion of sales of our pavement products into areas increasingly in need of newly paved roads and increased sales of activated carbon solutions driven by anticipated regulatory changes in global automotive gasoline emissions control standards.

Increase Our Offering of Specialized, Higher Margin Products

We employ a world-class team of engineering, technical, sales, and application specialists, along with experienced industry professionals, which provide us with deep technical knowledge and the ability to be a leading provider of specialty products in the markets we serve. We have the experience and capability to further develop and expand upon the products we currently produce, further differentiating them into higher value, increasingly specialized products, or developing new applications and end uses.

We have a history of success in product development and differentiation. For example, our oilfield technologies business focuses on development and marketing of specialized tall oil based emulsifiers and corrosion inhibitors as well as marketing the base tall oil fatty acid ("TOFA") refinery products.

We believe that there is significant upside in further developing and expanding upon products produced from TOFA, displacing some of our lower margin business where we sell TOFA directly to certain customers. This will have the added benefit of improved insulation from the cyclical nature of the direct natural fats and oils market of which TOFA is a part. Our goal is to increase the portion of our sales of specialized, higher value products derived from TOFA, including addressing new markets or opportunities to upgrade TOFA into product categories where we might not participate today.

Additionally, we search to supply the right chemistry for the applications within our market segments regardless of the raw materials required. Applying our unique insights into the end use applications of our products, our team searches to find novel solutions, outside of our current CTO-based materials, to problems and our team also works to create the supply chain needed to provide those products to our customers. As an example, we have developed and now manufacture and sell product solutions in our pavement technologies business that are TOFA and hydrocarbon based.

We also believe that there is significant upside in further developing and expanding caprolactone-based products and derivatives. The end-markets in which we are expanding have favorable trends that we believe will support growth rates higher than global GDP. For example, caprolactone’s performance properties give it superior performance in biodegradable plastics, medical devices, and 3-D printing, among others.

Innovate to Enable Our Customers to Adapt to Increasingly Stringent Regulatory Standards

We are a valued resource to government and regulatory agencies around the world, from California to China, including national, regional, and local environmental regulatory bodies. We work directly with such bodies, in support of our customers, to help them develop sensible standards based on the availability of technological solutions that make such standards commercially achievable. As standards are adopted and become increasingly demanding, the products that can be used to achieve compliance with such standards become increasingly technologically complex to design and manufacture on a commercial level. Our ability to meet these complexities provides Ingevity with a distinctive commercial edge-as our customers in many applications depend on us to help them meet their compliance

standards. We also work closely with automotive companies and their suppliers to ensure that they understand and can meet increasingly stringent vehicle emission standards.

Invest Organically and Selectively Pursue Acquisitions that Further Strengthen Our Product Portfolio

We plan to continue to invest capital organically in attractive cost reduction projects and in capacity expansions as necessary to meet demand growth. For example, in 2016, to meet the growing demand for our activated extruded honeycomb products that help meet the U.S. and Canadian Low Emission Vehicle, or LEV III, and Tier 3 regulations, we began a capital

expansion at our Waynesboro, Georgia honeycomb extrusion facility that effectively doubled the capacity output by the end of 2017. To support future demand for the China 6 regulation, we have invested in new activated carbon pellet extrusion capacity in Changshu, China which came online in late 2018. In 2018, we also commenced a brownfield expansion at our Covington, Virginia activated carbon facility in order to meet the growing activated carbon demand for the China 6 regulation. In 2019, we will be continuing growth expansion work at our Warrington, U.K. caprolactone facility that includes debottlenecking and replacement of monomer production equipment that is more modern and efficient. As demand for our products grows, we will continue to evaluate additional capacity expansion as needed.

In addition, we intend to pursue value-creating acquisitions, such as the acquisition (the "Pine Chemicals Acquisition") of Georgia-Pacific's Pine Chemicals business ("Pine Chemicals Business") and the acquisition of the remaining 30 percent ownership interest of our Purification Cellutions, LLC joint venture (now known as Ingevity Georgia, LLC), both of which represented attractive opportunities in our target markets as well as in high-value niche applications that complemented our product portfolio and capabilities. We continue to seek to add product lines and portfolios, such as the acquisition (the "Caprolactone Acquisition") of Perstorp Holding AB’s caprolactone division (the "Caprolactone Business"), which we believe serves end-markets with growth rates significantly greater than global GDP, as well as having the potential to be a platform for additional bolt on acquisitions. We will continue to seek to add product lines and portfolios, as well as marketing and manufacturing alliances, that will play an important role in strengthening our leadership positions. We are evaluating acquisitions both domestically and globally.

Segments

Performance Materials

We engineer, manufacture, and sell hardwood-based, chemically activated carbon products, produced through a highly technical and specialized process primarily for use in gasoline vapor emission control systems in cars, trucks, motorcycles, and boats. We are a global leader in this automotive application. We also produce a number of other activated carbon products for food, water, beverage, and chemical purification applications, to maximize the productivity of our manufacturing assets.

Our automotive carbon products capture gasoline vapor emissions that would otherwise be released into the atmosphere as VOCs, which contain hazardous air pollutants and can photochemically react to form ozone and secondary organic aerosols. These gasoline vapor emissions (which are distinct from tailpipe emissions) are released primarily (i) during refueling, (ii) when a vehicle is parked during the daytime, as a result of evaporation and expansion of vapors in the fuel tank in warmer daytime temperatures and (iii) as “running loss,” as a result of evaporation and expansion of vapors in the fuel tank from increased temperatures as a result of operation of the vehicle.

Our automotive carbon products are typically part of vehicle-based gasoline vapor emissions control systems which can range from systems equipped with an approximately one liter carbon canister that captures one day of diurnal parking emissions, to more sophisticated Onboard Refueling Vapor Recovery (“ORVR”), running loss and multi-day diurnal parking systems with a two to three-liter carbon canister that is over 98 percent efficient. The captured gasoline vapors are largely purged from the carbon and directed to the engine where they are used as supplemental power for the vehicle. In this way, our automotive carbon products are part of a system that provides for both environmental control and energy recovery. We estimate that in 2016 our products collectively prevented over 20,000 metric tons of VOC emissions each day from being lost to the atmosphere and returned the equivalent of 8 million gallons of gasoline each day to power vehicles.

Environmental standards drive the implementation of gasoline vapor emission control systems by automotive manufacturers. While tailpipe emissions on vehicles are well recognized, understood, and regulated, gasoline vapor emissions from vehicles have been lightly regulated in many countries outside the U.S., Canada, Brazil, and China. For those countries that have not significantly regulated gasoline vapor emissions, enacting more stringent regulations represents a low-cost, high-return opportunity to address their air quality issues. The annual global sales of light duty

vehicles (i.e., passenger and light commercial vehicles) that are powered with gasoline are forecast to grow from approximately 76 million to approximately 92 million vehicles, an increase of 21percent from 2017 to 2027. Most of this growth is expected to occur outside of the U.S., Canada, and China in countries and regions where gasoline vapor emission standards significantly lag the new modern, highly effective standards that are currently being implemented in the U.S., Canada, and China. Adoption of modern gasoline vapor emission standards in these regions would have significant, positive environmental and energy efficiency impacts and provide significant upside growth potential for our automotive carbon business.

The U.S. and Canada have led the world in recognizing and addressing the harm to air quality caused by gasoline vapor emissions, and in early 2014 enacted regulatory standards that will further reduce these emissions to “near zero” levels by phasing in Tier 3 and LEV III evaporative emission standards through 2022, which will result in significant increases in the use of our “canister bleed emissions” system patent over that same period. The Tier 3 and LEV III phase in schedule requires compliance with the standard as follows: 40 percent of model year 2017’s vehicles, 60 percent of model year 2018’s vehicles, 80 percent of model year 2020’s vehicles and 100 percent of model year 2022’s vehicles. The most commonly applied embodiment of the patent

uses our activated carbon in the main part of the canister and our activated carbon extruded honeycomb(s) as a "scrubber" on the outlet side of the canister to reduce the canister's emissions to "near zero." One of our significant "canister bleed emissions" patents expires in March 2022. The extruded honeycombs are manufactured through an activated carbon ceramic extrusion process at our Waynesboro, Georgia extrusion facility. We have a 100 percent controlling ownership and operating responsibility at this facility, after having purchased the remaining 30 percent ownership interest in Purification Cellutions, LLC joint venture (now known as Ingevity Georgia, LLC) from our partner in August of 2018.

Most countries outside the U.S., Canada, China, and Brazil have significantly lagged in the adoption of regulatory standards that would reduce these gasoline vapor emissions, focusing instead on regulating the more "visible" tailpipe emissions. These countries are using a gasoline vapor emission standard that is functionally equivalent to a 1981 U.S. regulatory standard. As a result, in Europe, Asia, and Latin America, gasoline vapor emissions are the primary source of automotive VOC emissions. China has begun implementation of a new national standard, China 6, that is functionally equivalent to the 2009 alignment of U.S. Tier 2 with California LEV II. This new national standard, containing ORVR and multi-day diurnal parking emission controls, is scheduled to be fully phased in by July 2020 with the announced early implementation in several large, provincial, and municipal regions beginning in 2019.

As recognized experts in the field of gasoline vapor emission control, Ingevity has been working with regulatory bodies and relevant third parties in Brazil, China, Japan, Mexico, and the European Union to help them understand and move towards more effective regulatory standards similar to those in place in the U.S. and Canada. Regulatory indications of adoption and implementation of more stringent vapor emissions standards outside of the U.S. and Canada include the following:

•The European Commission has adopted more stringent gasoline vapor emission regulations with its Euro 6d standard, which requires full implementation by September 2019. This new standard is more stringent than the current standards and includes a 2-day diurnal parking emission test that will generally result in a 30 - 70 percent increase in canister capacities and a shift in some volumes to pellets and higher activity carbon.

•In its November 2007 session, the World Forum for Harmonization of Vehicles Regulations (WP 29) established an Informal Working Group (IWG) under the Working Party on Pollution and Energy (GRPE) to prepare a road map for Worldwide Harmonized Light Vehicle Test Procedures (WLTP), including those for evaporative emissions as part of Phase 2 of the effort. Global Technical Regulation (GTR) No. 19 established a 48-hour test procedure, based upon the European 48-hour procedure, that can be adopted by contracting parties (i.e. participating countries) across the globe.

•On December 23, 2016, the China Ministry of Environmental Protection and the China State Administration of Quality Supervision, Inspection, and Quarantine released its China 6 National Standard on the Limits and Measurement Methods for Emissions from Light-Duty Vehicles (GB 18352 6-2016). In the new standard, diurnal control is increased to 48 hours, running loss conditions are simulated, and ORVR is added. Emissions limits are also reduced and will be similar to those in U.S. Tier 2. As a result, canister volumes are expected to increase by 2 to 3 times and the majority of the canisters are expected to shift to high activity carbons and pellets. This new standard implements nationally on July 1, 2020 but a number of cities and provinces – including Beijing, Hainan, Hebei, Henan, Guangzhou, Shenzhen, Tianjin – have announced early implementation dates ranging from July 1, 2019 to January 1, 2020.

•South Korea is currently phasing in some U.S. Tier 2 diurnal parking emission standards, which generally require activated carbon canister volumes greater than 1.3 liters and an increased use of pelletized carbon. In 2018, South Korea began phasing in portions of the U.S. Tier 3 "near zero" full vehicle diurnal parking emission standards that will favor the use of low emission and air induction system diurnal parking emission activated carbon technologies.

•In November 2018, Brazil's National Council for the Environment ("CONAMA") plenary finalized the Program for the Control of Air Pollution by Motor Vehicles ("PROCONVE") L7 regulations that included a hot-soak and 48-hour diurnal requirement - with an emission limit similar to US Tier 2 - that must be fully implemented by January 2022. An ORVR requirement was also passed that will be implemented in stages in 2023 (20 percent of new vehicles), 2024 (60 percent of new vehicles), and 2025 (100 percent of new vehicles).

See also “Risk Factors-Risks Related to Ingevity’s Business-Adverse conditions in the automotive market may adversely affect demand for our automotive carbon products” and “Risk Factors-Risks Related to Ingevity’s Business-If increasingly more stringent air quality standards worldwide are not adopted, our growth could be impacted.” Current regulatory standards in the U.S. and Canada require that gasoline vapor control devices remain effective for the entire life of the vehicles on which installed. The end of lifetime requirements for most vehicles is 10 years or 120,000 miles, but will increase to 15 years or 150,000 miles for a large segment of these vehicles. China 6 standards also include a lifetime requirement of 12 years or 160,000 kilometers. Ingevity has a substantial, decades long track record of providing life-of-vehicle product

performance based on our unique capability to engineer a very specific mesoporous carbon on a large commercial scale. Given the imperative for automotive manufacturers to produce vehicles capable of meeting these long term requirements, or potentially face expensive recalls and unfavorable publicity, there is an increased risk to using other producers who do not have a comparable, proven history, particularly given the significant costs associated with non-compliance should an offering fail to maintain effectiveness over vehicle lifetimes. Additionally, because these gasoline vapor control systems are certified as "environmental devices" for models currently in production, it is time consuming and costly to replace our products within the vehicle's control system with a competitive product during the vehicle's model platform production life due to the high cost of recertification.

As a result of decades of innovation and production, Ingevity is able to produce products that are effective in smaller amounts than competitors' offerings, meaning less product is required-which results in savings through the use of a smaller and less costly canister in the overall emissions control system. Continued innovation and manufacturing know-how may allow this advantage to continue even as competitors improve their product offerings.

Ingevity is further uniquely positioned to capitalize on the opportunity afforded by the adoption of these modern vapor emission regulatory standards, which will, as a practical matter (given current technology), require manufacturers of light duty vehicles in countries adopting these standards to incrementally install advanced gasoline vapor control technology with carbon capable of meeting the new regulatory standards. Based on the regulatory trends and expected growth in vehicles, Ingevity management estimates that the revenue for its automotive emissions products could double within five to seven years from 2015. Ingevity, through its proprietary technology, trade secrets and confidential manufacturing know-how, has unparalleled capability and expertise to manufacture the high performance activated carbon products required to meet these regulatory standards, as well as more stringent standards likely to be imposed in the years to come. These same capabilities and expertise will help Ingevity to maintain its position in the U.S. and Canada automotive markets as they implement the adoption of "near zero" gasoline vapor emission levels. Additionally, as automotive engine technology continues to evolve and engines become more efficient, the amount of engine airflow available to purge the gasoline vapors from the activated carbon products is expected to decline ("low-purge"). We believe that the pore structure characteristics of our activated carbon products additionally advantages us versus competitors' offerings in low purge conditions. Ingevity is actively investing in product and process development, and has received patents designed to deal with low-purge engines.

We also produce a number of other activated carbon products for food, water, beverage, and chemical purification applications to maximize the productivity of our manufacturing assets.

Raw Materials and Production

The primary raw material (by volume) used in the manufacture of our activated carbon is hardwood sawdust. Sawdust is readily available, and is sourced through multiple suppliers to protect against supply disruptions and to maintain competitive pricing.

We also consume phosphoric acid, which is used to chemically activate the hardwood sawdust. This phosphoric acid is sourced through multiple suppliers to protect against supply disruptions and to maintain competitive pricing. The market price of phosphoric acid is affected by the global agriculture market as the majority of global phosphate rock production is used for fertilizer production and only a portion of that production is used to manufacture purified phosphoric acid. In the recent past, there have been price run-ups in phosphoric acid due to increased phosphate rock demands in global agriculture, which have in turn negatively affected our business.

Activated carbon is an amorphous form of carbon characterized by a high volume of nanoscale pores. "Activation" refers to the process of developing these pores. The size, shape, and volume of the pore structure and the surface chemistry of the pore are critical for driving performance in various applications.

Activated carbons are typically produced from either a thermal or chemical process utilizing a wide variety of carbonaceous raw materials. The thermal process, the most widely used activation process, uses rotary kilns or multi-hearth furnaces to carbonize and activate the raw material. This process operates at a much higher temperature and at a lower yield than the chemical activation process. Typical raw materials include bituminous coal, lignite, and coconut husks. Thermally activated carbons are usually used for "catch and dispose" applications, whereby the carbon is used to capture certain compounds and the carbon product is then disposed of or thermally regenerated.

Ingevity employs a more specialized activation process, whereby chemical catalyst - phosphoric acid - and various heating methods are used to facilitate the development of porosity. This process operates at a lower temperature and typically has higher yields than a thermal process. Carbons produced by this method typically have larger pores than thermally activated carbons and can be used in both “catch and dispose” applications and “catch and release” applications, whereby the carbon is used to capture and temporarily hold on to certain compounds which are then released in a controlled manner under specific operating conditions.

We use hardwood sawdust to produce chemically activated carbon, which, because of its larger pore volume, pore structure and high surface area, is well-matched for a variety of applications and ideally suited for the “catch and release” automotive application of capturing and reusing gasoline vapor emissions.

We further process activated carbon after it is activated into different forms using a variety of extrusion processes. One of our extrusion processes is to use activated carbon and various binders to make a formed pellet. Pelleted carbon is typically used in gasoline emission control canister applications where a low pressure drop system is required such as ORVR.

Another extrusion process we employ is with our honeycomb “scrubber.” We utilize an activated carbon infused ceramic extrusion process. These extruded honeycomb “scrubbers” are a component of the our patented system to reduce the canister’s emissions to “near zero” and are manufactured at our extrusion facility in Waynesboro, Georgia.

Customers

We sell our automotive products to over 60 customers around the globe. In 2018, our ten largest customers accounted for 80 percent of the segment's sales. We are the trusted source of these products for many of the world’s largest automotive parts manufacturers, including Aisan Industry, Delphi Technologies, MAHLE, and many other large and small component manufacturers throughout the global automotive supply chain. Our relationship with many of our customers and their customers-the vehicle manufacturers themselves-have been in place for most of our history in this application. Ingevity also produces activated carbon products for food, water, beverage and chemical purification applications, which are sold to approximately 80 customers throughout the world.

We operate primarily through a direct sales force in North America and our other major markets and also have a smaller, focused network of agents and distributors that have established a strong direct sales and marketing presence.

Competition

In automotive carbon, Ingevity has a unique decades-long track record of providing life-of-vehicle performance. Given the imperative for automotive manufacturers to produce vehicles for the U.S., Canadian, and Chinese markets capable of meeting life-of-vehicle emission standards, or potentially face expensive recalls and unfavorable publicity, our automotive carbon products provide our customers the low-risk choice in this high performance application. Our competitors in automotive carbon include Cabot Corp., Kuraray, and several Chinese manufacturers. Our process purification business competes mainly in the U.S. in the food, beverage, chemical, and water purification applications. Competitors in our process purification product line include Cabot Corp., Kuraray, Jacobi Carbons, and several domestic U.S. manufacturers and distributors of imported products. Refer to Item 1A - "Risk Factors- We face competition from producers of substitute products and new technologies, and new or emerging competitors." and "Risk Factors-We face competition from infringing intellectual property activity.”

Performance Chemicals

Ingevity’s Performance Chemicals segment, which is comprised of four application areas (pavement technologies, oilfield technologies, industrial specialties, and engineered polymers), develops, manufactures, and sells a wide range of specialty chemicals primarily derived from co-products of the kraft pulping process and caprolactone. Pine chemicals-based products are utilized in pavement preservation, pavement adhesion promotion, warm mix asphalt, oil well service additives, oil production, and downstream, printing inks, adhesives, agrochemical dispersants, lubricants, coatings, resins, elastomers, bioplastics, and other diverse industrial uses. Our application expertise is often called upon to provide unique solutions to our customers that maximize resource efficiency. We have a broad and diverse customer base in this segment. In 2018, our top ten customers accounted for approximately 33 percent of our segment revenue; the next 100 customers made up approximately 45 percent of our segment revenue.

Raw Materials and Production

Our Performance Chemicals business serves customers globally from three manufacturing locations in the U.S. and one in the United Kingdom. Most of our pavement technologies, oilfield technologies, and industrial specialties products are derived from CTO, a co-product of the kraft pulping process, where pine is used as the source of the pulp. CTO is produced by acidulating black liquor soap skimmings ("BLSS"), which are recovered during the kraft pulping process. Consumers of CTO can purchase BLSS from pulping mills that do not have acidulation capacity (in which

case the BLSS will need to be acidulated into CTO), and purchase CTO from pulping mills that do have acidulation capacity. The CTO is further separated by distillation into tall oil rosin ("TOR"), TOFA and other biofractions. As such products are further refined or chemically modified, higher value derivative products are created, making their way into a wide variety of industrial and consumer goods. We also produce performance chemicals derived from lignin, extracted from black liquor, a co-product of the kraft pulping process. TOR, TOFA and caprolactone are sold directly to customers in some instances, or, along with lignin, further refined or chemically modified into higher value derivative products. Our differentiated performance chemicals are engineered to meet specific industry standards and customer

requirements. Our engineered polymers are caprolactone based, which is derived from cyclohexanone, a benzene derivative, and hydrogen peroxide, both of which are readily available in the market.

The availability of CTO is directly linked to the production output of kraft mills using pine as their source of pulp, which is the predominant fiber source for packaging grades of paper as well as fluff pulp for personal care products. As a result, there is a finite global supply of CTO, with global demand for softwood kraft pulp driving the global supply of CTO, rather than demand for CTO itself. Most of the CTO made available for sale by its producers is covered by long-term supply agreements, further constraining availability.

At the time of the Separation, we entered into a long-term supply agreement with WestRock pursuant to which we purchase all of the CTO output from WestRock's existing (at the time of separation) kraft mills, subject to certain exceptions. Beginning in 2025, either party may provide a notice to the other party terminating the agreement five years from the date of such notice. Beginning one year after such notice, the quantity of products provided by WestRock under the agreement will be gradually reduced over a four-year period based on the schedule set forth in the agreement. In addition, from 2022 until 2025, either party may provide one-year notice to remove a kraft mill as a supply source. The two largest kraft mills under the agreement currently are expected to supply approximately 19 to 20 percent and 17 to 18 percent, respectively, of the total amount of products expected to be supplied under our agreement with WestRock. In the event that WestRock exercises its right to terminate our supply agreement with them or remove a kraft mill as a supply source, we may be able to obtain substitute supplies of CTO from other suppliers, spot purchases or a new contract with WestRock. The agreement with WestRock includes pricing terms based on market prices. Under this agreement, based on WestRock's current output, we currently expect to source approximately 30 to 40 percent of our CTO requirements through 2025 based on the maximum operating rates of our three Performance Chemicals' facilities.

In 2018, we entered into a 20-year supply agreement with Georgia-Pacific pursuant to which we will purchase the lesser of 125,000 tons or 100 percent of the CTO production from select Georgia-Pacific kraft mills during each contract year, subject to certain exceptions. The agreement with Georgia-Pacific includes a market pricing formula which is subject to quarterly adjustments. Under this agreement, we currently expect to source approximately 30 percent of our CTO requirements through 2025 based on the maximum operating rates of our three Performance Chemicals' facilities.

We have agreements with other suppliers to satisfy substantially all of the balance of our expected requirements of CTO through 2019.

We believe that we are well positioned to have sufficient CTO required for our operations. However, if any of our suppliers (including WestRock or Georgia-Pacific) fail to meet their respective obligations under our supply agreements or we are otherwise unable to procure an adequate supply of CTO, we would be unable to maintain our current levels of production. In addition, if WestRock exercises its rights to terminate the agreement or remove a kraft mill as a supply source, and we are unable to arrange a substitute supply of CTO, we would be unable to maintain our current levels of production. Additionally, there are other pressures on the availability of CTO. Some kraft pulp mills may choose to consume their production of CTO to meet their energy needs rather than sell the CTO to third parties. Furthermore, weather conditions have in the past and may in the future affect the availability and quality of pine trees used in the kraft pulping process and therefore the availability of CTO meeting our quality standards. See "Risk Factors-Risks Related to Ingevity's Business-Our Performance Chemicals segment is highly dependent on CTO which is limited in supply; lack of access to sufficient CTO would impact our ability to produce CTO-based products." Also, regulatory mandates in Europe for the use of biofuel have placed additional pressure on CTO availability. See "Risk Factors-Risks Related to Ingevity's Business-The European Union's Directive 2009/28 on the promotion of the use of energy from renewable resources ("Renewable Energy Directive" or "RED") and similar legislation in the U.S. and elsewhere may incentivize the use of CTO as a feedstock for production of alternative fuels."

Finally, CTO as a raw material may be subject to significant pricing pressures. See "Risk Factors- Risks Related to Ingevity's Business-Pricing for CTO is subject to particular pricing pressures by reason of limited supply and competing demands for end use, and we may be limited in our ability to pass on increased costs to our customers" and "Risk Factors-Risks Related to Ingevity's Business-The Company's oilfield technologies business is significantly

affected by trends in oil and natural gas prices that affect the level of exploration, development and production activity."

The key raw materials in our Performance Chemicals caprolactone manufacturing are cyclohexanone and hydrogen peroxide. Cyclohexanone is derived from benzene and is widely available. We maintain multiple suppliers to protect against supply disruptions and to maintain competitive pricing. Hydrogen peroxide is also widely available and is currently supplied by a co-located supplier under a long-term supply agreement. However, Brexit may pose some risk to the supply chain for our Warrington, UK Performance Chemicals facility. See See "Risk Factors- General Business and Economic Risk- Our Engineered Polymers product line may be adversely affected by Brexit."

The other key raw materials used in the Performance Chemicals business are nonylphenol, pentaerythritol, and ethylene amines. These are sourced where possible through multiple suppliers to protect against supply disruptions and to maintain competitive pricing.

Markets Served

Pavement Technologies

Our pavement technologies group supplies a broad line of innovative additives, systems and technologies for road construction, resurfacing, preservation, maintenance, and recycling globally. As a specialty asphalt additive supplier, we have a long history of work with transportation agencies, university research consortiums, paving contractors, and asphalt refiners around the world to design, develop, and implement innovative additives and novel paving systems that protect existing roadways and enhance the performance of new road construction.

Our pavement technologies team combines broad downstream technical, application, and construction experience with a strong direct sales and marketing presence. Our combined expertise in the disciplines of chemistry and civil engineering provides a comprehensive understanding of the relationship between molecular structure of our chemistries and their impact on the performance of pavement systems. This allows us to develop products customized to local markets and consistently deliver cost-effective solutions for our clients. We also introduce and commercialize new technologies globally through consulting relationships with ministries and departments of transportation to stimulate customer demand for our products.

Customers

We supply asphalt products and technologies to approximately 500 customers through the use of Ingevity sales representatives and distributors. In 2018, our ten largest customers accounted for 35 percent of the product line's sales. Technology centers located in the U.S., China, Europe, and India create market insights for product development customized to local and regional markets.

Competition

We compete on the basis of deep knowledge of our customers' business and extensive insights into road building technologies and trends globally. We use these strengths to develop consulting relationships with government departments of transportation, facilitating new technology introduction into key markets around the world. Our combined expertise in the disciplines of chemistry and civil engineering provides a comprehensive understanding of the relationship between molecular structure of our chemistries and their impact on the performance of pavement systems. This allows us to develop products customized to local markets and to consistently deliver cost-effective solutions for our customers. Our primary competitors in pavement technologies are Nouryon, Arkema, and ArrMaz.

Oilfield Technologies

Our oilfield technologies group produces and sells a wide range of innovative specialty chemical products for the global oilfield industry, including well service additives and chemical solutions for production and downstream applications.

Well Service Additives. Our well service additive products are formulated to increase emulsion stability and aid in fluid loss control for oil-based drilling fluids. Other additives include rheology modifiers, which are used to improve the viscosity properties of oil-based fluids, and are typically used in deep water applications and wetting agents, which provide improved wetting of solids and aid in the efficiency of the drilling process. This family of products aids in accessing difficult to reach oil and gas reserves, both on and offshore around the globe.

Production and Downstream. Our production and downstream products serve as corrosion inhibitors or their components. Crude oil and natural gas production is characterized by variable production rates and unpredictable changes due to the nature of the produced fluids including but not limited to water and salt content. Our corrosion inhibitors maximize production rates by reducing equipment downtime from corrosion of key equipment and pipe.

Customers

We sell our oilfield technologies to approximately 70 customers around the globe through the use of Ingevity sales representatives and distributors. In 2018, our ten largest customers accounted for 81 percent of product line.

Competition

We compete on the basis of our ability to understand our customers' applications and deliver solutions that aid in their improvement of the exploration and production of oil and gas for the end users. Additionally, this application expertise coupled with our strong understanding of CTO-based chemistry allows for rapid development of solutions to challenges in the field. Our scale and flexibility of manufacturing are the final piece that helps deliver the creativity,

expedience, and confidence the customers in oilfield technologies require from their best suppliers. Our competitors in this field include Lamberti, Kraton, and several others.

Industrial Specialties

Our industrial specialties group manufactures specialty chemicals-including: adhesive tackifiers, agrochemical dispersants, lubricant additives, printing inks, and industrial intermediates. Our technical expertise and formulation capabilities

allow us to develop innovative products to meet our customers' various needs.

Adhesives. We are a leading global supplier of tackifier resins which provide superior adhesion to difficult-to-bond materials to the adhesives industry. Adhesive applications for our products include construction, product assembly, packaging, pressure sensitive labels and tapes, hygiene products, and road markings.

Agrochemicals. We produce dispersants for crop protection products as well as other naturally derived products for agrochemicals. Crop protection formulations are highly engineered, specifically formulated and cover a range of different formulation types, from liquids to solids. We deliver a wide range of dispersants that are high performing and consistent. In addition, our crop protection products are approved for use as inert ingredients in agrochemicals by regulatory agencies throughout the world.

Lubricants. We supply lubricant additives and corrosion inhibitors for the metalworking and fuel additives markets. Our lubricant products are multi-functional additives that contribute to lubricity, wetting, corrosion inhibition, emulsification, and general performance improvement. Our products are valued because of their ease in handling, robust performance, and improved formulation stability.

Printing Inks. We are a leading supplier of ink resins from renewable resources to the global graphic arts industry for the preparation of printing inks. Our products improve gloss, drying speed, viscosity, adhesion, and rub resistance of the finished ink to the substrate. We produce a wide array of resins, typically specifically tailored to a customer's use, which can vary by application, pigment type, end use, formulation and manufacturing, and printing process.

Industrial Intermediates. Our functional chemistries are sold across a diverse range of industrial markets including, among others, paper chemicals, textile dyes, rubber, cleaners, mining, and nutraceuticals.

Customers

We sell our industrial specialty chemicals to over 500 customers around the globe through the use of Ingevity sales representatives and distributors. We have an over twenty-year relationship with many of our significant customers in this business. In 2018, our ten largest customers accounted for 45 percent of the product line's sales.

Competition

In industrial specialties, our customers select the product that provides the best balance of performance, consistency, and price. Reputation and commitment to our customer's industry are also valued by our customers and allow us to win business when other factors are equal. In our adhesives business, our products compete against other tackifiers, including other TOR-based tackifiers as well as tackifiers produced from gum rosin and hydrocarbon starting materials. In addition, the choice of polymer used in an adhesive formulation drives the selection of tackifier. In agrochemicals, the selection of a dispersant is made early in the product development cycle and the formulator has a choice among Ingevity's sulfonated lignin products, lower quality lignosulfonates and other surfactants such as naphthalene sulfonates. In lubricants, we compete against other producers of distilled tall oil and additives. In printing inks, our products compete against other resins that can be derived from TOR, gum rosin and, to a lesser extent, hydrocarbon sources. In our industrial intermediates business, our TOFA competes against widely available fats and oils derived from soy, rapeseed, palm, cotton, and tallow sources.

Competitors are different depending on the product, application, and region and include Kraton, Eastman Chemical, ExxonMobil, Borregaard, Lawter, Respol/Forchem, DRT, as well as several others.

Perstorp AB's Caprolactone Business

On December 10, 2018, we entered into an agreement for the Sale and Purchase of Perstorp UK Ltd. (the "Caprolactone Agreement") with Perstorp Holding AB, a company registered in Sweden, that develops, manufactures, and sells specialty chemicals (the "Seller"). Pursuant to the Caprolactone Agreement, we agreed to purchase the shares held by the Seller in Perstorp UK Ltd., including the Seller's entire caprolactone business, in exchange for €570.9 million, less assumed debt and other miscellaneous transaction costs, as further defined in the Caprolactone Agreement (the "Purchase Price"), plus interest accrued on the Purchase Price (herein referred to as the "Caprolactone Acquisition").

On February 13, 2019, pursuant to the terms and conditions set forth in the Caprolactone Agreement, we completed the Caprolactone Acquisition for an aggregate preliminary purchase price of €578.9 million ($652.5 million) excluding net debt to be assumed of €100.4 million ($113.1 million). At closing, the assumed net debt was settled with an affiliate

of the counterparty, Perstorp Holding AB. Beginning in the first quarter of 2019, the Caprolactone Acquisition will be integrated into our Performance Chemicals segment and included within our Engineered Polymers product line. Our revolving credit facility was utilized as the primary source of funds, along with available cash on hand, to close our Caprolactone Acquisition. Our available capacity under our revolving credit facility immediately following this drawdown was $113.1 million.

The Caprolactone Acquisition is considered a business under business combinations accounting guidance, and therefore we will apply acquisition accounting. Acquisition accounting requires, among other things, that assets and liabilities assumed be

recognized at their fair values as of the acquisition date. The net assets of the Caprolactone Acquisition will be recorded at the estimated fair values using primarily Level 2 and Level 3 inputs (see Note 17 for an explanation of Level 2 and 3 inputs).

We have performed a preliminary valuation of the fair value of the acquired assets and liabilities assumed. Based on this preliminary allocation of the purchase price, we believe the primary assets acquired and their estimated values are; goodwill of approximately $310 million and tangible and intangible assets of approximately $220 million. This preliminary assessment of fair value is based on draft reports from our valuation experts and is subject to change based on its preliminary nature. Once our detailed preliminary purchase price valuation is completed, we will include the required additional details in our future filings. We have not completed the detailed analysis to present the pro forma financial information for the combined companies. Thus, the pro forma financial information will be included in our future filings as well.

Engineered Polymers

Our engineered polymers group produces caprolactone and caprolactone based specialty chemicals for use in coatings, resins, elastomers, adhesives, and bioplastics. Our technical expertise and formulation capabilities allow us to develop innovative products to meet our customers' various needs.

Coatings. We supply coating products that are used in automobile refinishing, sports floors, and marine applications. Our products enhance end product performance by providing abrasion resistance, long durability, high quality finish, and enhanced performance in resin modification. Our products are often preferred when they provide a combination of traits which allow customers to displace several combinations of other products.

Resins. We supply resin products that are used in acrylic resins, polyurethane, and inks. Our products enhance end product performance due to their protective properties, all weather performance and reduction or elimination of the need for solvents in formulations. Our products tend to be preferred where superior or particular performance levels are required by our customers.

Elastomers. We supply products that are used in wheel seals, mining screens, and polyurethane films. Our products enhance end product performance due to their resistance to wear and tear, the ability to maintain form and function under pressure and temperature and provide excellent UV resistance. Our products are often used in highly demanding applications where competitive products do not reach required performance levels.

Adhesives. We supply products that are used in hot-melts, fabric lamination, and miscellaneous footwear components. Our products enhance end product performance through their durability and substrate compatibility. Our products tend to be preferred because they are found to be easier to process and apply compared to competitive offerings.

Bioplastics. We supply products that are used in films, paper coatings, disposable cups, utensils, and packaging. Our products enhance end product performance due to the combination of their biodegradability and stability, strength properties, and food friendliness (some products EU food contact approved). Our products tend to improve processing of existing bioplastic solutions.

Other. We supply additives that are used in medical devices, 3-D printing, and miscellaneous footwear components. Our additives enhance end product performance due to their low melting point and ability to be thermoformed. Our products improve process conditions and improve the surface finish of the end product compared to competitive offerings.

Customers

We sell our engineered polymers chemicals to approximately 400 customers around the globe through the use of Ingevity sales representatives and distributors. We have a 40-year history in the business and have some customers with relationships greater than ten years.

Competition

In engineered polymers, we face competition from not only other producers of caprolactone, but other competing technologies. We compete on the basis of performance as compared to the other materials. In coatings, we compete against PTMEG, polycarbonates, and polyols. In resins, we also compete against hydroxy monomers, oxitanes, allyl ethers and hydroxy acrylates. In elastomers, we compete against PTMEG, HDO adipates, polycarbonates and polyesters. In adhesives, we compete against TPU, surlyn, polyesters, EVA, and polyamids. In bioplastics, we

compete against PBAT, PBS, polylactide, and starch-based polymers.
The primary caprolactone competitors are Daicel and BASF.
Energy
Our manufacturing processes require a significant amount of energy. We are dependent on natural gas to fuel the processes in our chemical refineries and activated carbon plants. Although we believe that we currently have a stable natural gas supply and infrastructure for our operations, we are subject to volatility in the market price of natural gas. All of our manufacturing processes

also consume a significant amount of electricity. All of our facilities are located in regulated service areas that have stable rate structures with reliable electricity supply.

Environment

Our operations are subject to extensive regulation by federal, state, and local authorities, as well as regulatory authorities with jurisdiction over the foreign operations of Ingevity, including relating to the discharge of materials into the environment and the handling, disposal, and clean-up of waste materials, and otherwise relating to the protection of the environment. It is not possible to quantify with certainty the material effects that compliance with these regulations may have upon the capital expenditures, earnings or competitive position of Ingevity, but it is anticipated that such compliance will not have a material adverse effect on any of the foregoing. For a further discussion, see “Risk Factors-Risks Related to Ingevity’s Business-Our business involves hazards associated with chemical manufacturing, storage, transportation and disposal” and “Risk Factors-Risks Related to Ingevity’s Business-The Company’s operations are subject to a wide range of general and industry specific environmental laws and regulations.” Environmental regulation and legal proceedings have the potential for involving significant costs and liability for Ingevity.

Backlog

In general, we do not manufacture our products against a backlog of orders and do not consider backlog to be a significant indicator of the level of future sales activity. Production and inventory levels are based on the level of incoming orders as well as projections of future demand. Therefore, we believe that backlog information is not material to understanding our overall business and should not be considered a reliable indicator of our ability to achieve any particular level of revenue or financial performance.

Intellectual Property

Intellectual property, including patents, closely guarded trade secrets and highly proprietary manufacturing know-how, as well as other proprietary rights, is a critical part of maintaining our technology leadership and competitive edge. Our business strategy includes filing patent and trademark applications where appropriate for proprietary developments, as well as protecting our trade secrets. We actively create, protect, and enforce our intellectual property rights. The protection afforded by our patents and trademarks varies based on country, scope, and coverage, as well as the availability of legal remedies. Although our intellectual property taken as a whole is material to the business, other than our “canister bleed emissions” patent, which is part of our automotive business and expires in March 2022, there is no individual patent or trademark the loss of which could have a material adverse effect on the business. The most commonly applied embodiment of the “canister bleed emissions” patent uses our activated carbon in the main part of the canister and our activated carbon extruded honeycomb(s) as a “scrubber” on the outlet side of the canister to reduce the canister’s emissions to “near zero.” We are filing for and being granted patents for product and process developments for our Performance Materials business that we believe are both novel and consistent with trends in the technological development of engines. Our Evotherm Warm Mix Asphalt technology is supported by numerous global patents. Additionally, our Caprolactone Business and related technologies are supported by numerous global patents and trademarks, as well as proprietary manufacturing and technical know-how. See “Risk Factors-Risks Related to Ingevity’s Business-From time to time we are called upon to protect our intellectual property rights and proprietary information though litigation and other means; if we are unable to successfully protect our rights we may be negatively impacted from a financial as well as competitive advantage standpoint,” “Risk Factors-Risks Related to Ingevity’s Business-As we rely on information technologies to conduct our business, security breaches and other disruptions could compromise our information and expose us to liability, which could cause our business and reputation to suffer.”, and "Risk Factors-We face competition from infringing intellectual property activity."

Seasonality

There are a variety of seasonal dynamics, including global climate and weather conditions, that impact our businesses, though none materially affect financial results, except in the case of the pavement technologies business, where roughly 70 to 75 percent of its revenue is generated between April and September. From a supply perspective, this seasonality is effectively managed through pre-season inventory build then active inventory management throughout

the year.

Employees

We currently employ approximately 1,750 employees, of whom approximately 80 percent are employed in the U.S. Approximately 20 percent are represented by domestic (i.e. U.S.) labor unions under various collective bargaining agreements. We engage in negotiations with labor unions for new collective bargaining agreements from time to time based upon expiration dates of agreements and statutory requirements. We consider our relationships with all salaried, union hourly and non-hourly employees to be positive and collaborative.

During 2018, Ingevity ratified new labor agreements with United Steel Workers ("USW") and International Association of Machinists and Aerospace Workers ("IAM") at our Charleston, South Carolina location. The International Brotherhood of Electrical Workers ("IBEW") at our Charleston, South Carolina location ratified our contract offer made December 17, 2018 in January 2019. No collective bargaining agreements are scheduled to expire in 2019.

See “Risk Factors-Risks Related to Ingevity’s Business-Work stoppages and other labor relations matters may have an adverse effect on our financial condition and results of operations."

For further information on measures of profitability used by managers of the business and its segments, refer to “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

Item 1A. Risk Factors

Based on the information currently known to us, we believe that the following information identifies the most significant risk factors affecting our company. However, the risks and uncertainties our company faces are not limited to those set forth in the risk factors described below. Additional risks and uncertainties not presently known to us or that we currently believe to be immaterial may also adversely affect our business. In addition, past financial performance may not be a reliable indicator of future performance, and historical trends should not be used to anticipate results or trends in future periods.

If any of the following risks and uncertainties develops into actual events, these events could have a material adverse effect on our business, financial condition or results of operations. In such case, the trading price of our common stock could decline.

General Business and Economic Risks

We may be adversely affected by general global economic and financial conditions beyond our control.

Our businesses may be affected by a number of factors that are beyond our control such as general economic and business conditions, changes in tax laws or tax rates and conditions in the financial services markets including counterparty risk, insurance carrier risk, rising interest rates, inflation, deflation, fluctuations in the value of local currency versus the U.S. dollar or the impact of a stronger U.S. dollar which may negatively impact our ability to compete. Macro-economic challenges, including conditions in financial and capital markets and levels of unemployment, and the ability of the U.S. and other countries to deal with their rising debt levels may continue to put pressure on the economy or lead to changes in tax laws or tax rates. There can be no assurance that changes in tax laws or tax rates will not have a material impact on our future cash taxes, effective tax rate or deferred tax assets and liabilities. Adverse developments in global or regional economies could drive an increase or decrease in the demand for our products that could increase or decrease our revenues, increase or decrease our manufacturing costs and ultimately increase or decrease our results of operations, financial condition and cash flows. As a result of negative changes in the economy, customers, vendors or counterparties may experience significant cash flow problems or cause consumers of our products to postpone or refrain from spending in response to adverse economic events or conditions. If customers are not successful in generating sufficient revenue or cash flows or are precluded from securing financing, they may not be able to pay or may delay payment of accounts receivable that are owed to us or we may experience lower sales volumes. Our financial condition and results of operations could be materially and adversely affected by any of the foregoing.

We are exposed to the risks inherent in international sales and operations.

In 2018, export sales from the U.S. made up approximately one third of our total sales, and we sell our products to customers in approximately 75 countries. We have exposure to risks of operating in many foreign countries, including:

- fluctuations in foreign currency exchange rates, including the euro, pound sterling, Japanese yen and Chinese renminbi;
- restrictions on, or difficulties and costs associated with, the repatriation of cash from foreign countries to the U.S.;
- difficulties and costs associated with complying with a wide variety of complex laws, treaties and regulations;
- unexpected changes in political or regulatory environments;
- earnings and cash flows that may be subject to tax withholding requirements or the imposition of tariffs, exchange controls or other restrictions;
- political and economic instability;
- import and export restrictions, tariffs, and other trade barriers or retaliatory actions;
- difficulties in maintaining overseas subsidiaries and international operations;

- difficulties in obtaining approval for significant transactions;
- government limitations on foreign ownership;
- government takeover or nationalization of business; and
- government mandated price controls.

Any one or more of the above factors could adversely affect our international operations and could significantly affect our financial condition and results of operations. We have also expanded our participation in certain markets. As our international operations and activities expand, we inevitably have greater exposure to the risks of operating in many foreign countries.

Additionally, the U.S. has recently imposed tariffs on certain U.S. imports. China and other countries have responded with retaliatory tariffs on certain U.S. exports. If tariffs or other restrictions or retaliatory actions increase our operating costs in the future, and we are not able to recapture those costs from our customers, or if such tariffs or other restrictions make it more difficult for us to compete in overseas markets, our business, financial condition and results of operations could be adversely impacted.

Our reported results could be adversely affected by currency exchange rates and currency devaluation could impair our competitiveness.

Due to our international operations, we transact in many foreign currencies, including but not limited to the euro, pound sterling, Japanese yen and Chinese renminbi. As a result, we are subject to the effects of changes in foreign currency exchange rates. During times of a strengthening U.S. dollar, our reported net revenues and operating income will be reduced because the local currency will be translated into fewer U.S. dollars. During periods of local economic crisis, local currencies may be devalued significantly against the U.S. dollar, potentially reducing our margin. Ingevity may enter forward exchange contracts and other financial contracts in an attempt to mitigate the impact of currency rate fluctuations. However, there can be no assurance that such actions will eliminate any adverse impact from variation in currency rates. Also, actions to recover margins may result in lower volume and a weaker competitive position, which may have an adverse effect on our profitability.

Our operations outside the U.S. require us to comply with a number of U.S. and foreign regulations, violations of which could have a material adverse effect on our financial condition and results of operations.

Our operations outside the U.S. require us to comply with a number of U.S. and international regulations. For example, our operations in countries outside the U.S. are subject to the U.S. Foreign Corrupt Practices Act (“FCPA”), which prohibits U.S. companies and their agents and employees from providing anything of value to a foreign official for the purposes of influencing any act or decision of these individuals in their official capacity to help obtain or retain business, direct business to any person or corporate entity, or obtain any unfair advantage. Our activities may create the risk of unauthorized payments or offers of payments by our employees, agents or joint venture partners that could be in violation of anti-corruption laws, even though these parties are not subject to our control. We have internal control policies and procedures and training and compliance programs for our employees and agents with respect to the FCPA and other applicable anti-corruption laws. However, we cannot assure that our policies, procedures and programs always will protect us from reckless or criminal acts committed by our employees or agents. Allegations of violations of applicable anti-corruption laws may result in internal, independent or government investigations. Violations of anti-corruption laws may result in severe criminal or civil sanctions, and we may be subject to other liabilities, which could have a material adverse effect on our financial condition and results of operations.

In addition, the shipment of goods, services and technology across international borders subjects us to extensive trade laws and regulations. Our import activities are governed by the unique customs laws and regulations in each of the countries where we operate. Moreover, many countries, including the U.S., control the export and re-export of certain goods, services and technology and impose related export record-keeping and reporting obligations. Governments may also impose economic sanctions against certain countries, persons and entities that may restrict or prohibit transactions involving such countries, persons and entities, which may limit or prevent our conduct of business in certain jurisdictions. We are also required to comply with similar laws and regulations in other countries where we do business, with the same associated risks.

The laws and regulations concerning import activity, export record-keeping and reporting, export control and economic sanctions are complex and constantly changing. These laws and regulations can cause delays in shipments and unscheduled operational downtime. Moreover, any failure to comply with applicable legal and regulatory trading obligations could result in criminal and civil penalties and sanctions, such as fines, imprisonment, debarment from governmental contracts, seizure of shipments and loss of import and export privileges. In addition, investigations by

governmental authorities as well as legal, social, economic and political issues in these countries could have a material adverse effect on our business, results of operations and financial condition. We are also subject to the risks that our employees, joint venture partners and agents outside of the U.S. may fail to comply with other applicable laws.

Our Engineered Polymers product line may be adversely affected by Brexit.

On June 23, 2016, voters in the United Kingdom ("UK") approved an advisory referendum to withdraw from the European Union ("EU"), commonly referred to as "Brexit." Thereafter, on March 29, 2017, the UK formally notified the EU of its intention to withdraw pursuant to Article 50 of the Lisbon Treaty. The withdrawal of the UK from the EU will take effect either on the effective date of the withdrawal agreement or, in the absence of agreement, March 29, 2019, although this period can be extended with the unanimous agreement of the European Council. The long-term nature of the UK's relationship with the EU is unclear and there is considerable uncertainty if and when any withdrawal agreement will be agreed upon and implemented.

Brexit creates an uncertain political and economic environment in the UK and potentially across other EU member states for the foreseeable future, including during any period while the terms of Brexit are being negotiated and such uncertainties could impair or limit our ability to transact business in the UK and member EU states. The effects of Brexit will depend on any agreements the UK makes to retain access to EU markets either during a transitional period or more permanently. Brexit could adversely affect the UK, EU and worldwide economic or market conditions and could contribute to instability in global financial markets, and the value of the pound sterling or other currencies, including the Euro. Furthermore, Brexit could also have the effect of disrupting the free movement of goods, services, and people between the UK, the EU, and elsewhere.

Additionally, a significant portion of the regulatory regime that applies to us in the UK is derived from EU directives and regulations. For so long as the UK remains a member of the EU, these directives and regulations will (unless otherwise repealed or amended) remain in effect. However, Brexit could change the legal and regulatory framework within the UK and is likely to lead to legal uncertainty and potentially divergent national laws and regulations as the UK determines which EU laws to replace or replicate.

Depending on the Brexit outcome, it is possible that there may be adverse practical and/or operational implications on our business. Prior to the Caprolactone Acquisition we had no material suppliers located in the UK and during 2018 less than one percent of our sales were sold to customer locations within the UK. On February 13, 2019 we closed the Caprolactone Acquisition. The manufacturing operations of the Caprolactone Acquisition are located in Warrington, UK. The Warrington facility management team has been proactively planning for various Brexit contingencies since prior to the Caprolactone Acquisition. Such planning includes positioning additional raw materials in the UK, as well as storing addition inventories of products in the EU, in order to minimize the impact of any short term Brexit related supply chain disruptions. We do not have a significant number of UK or EU based employees that will need to change or clarify their immigration status as a result of Brexit. Additionally, we are planning for the impact of Brexit on REACH by working with our REACH only representative on a plan to ensure REACH registrations are in place in the UK and EU, for substances sold into the UK and EU as appropriate. While we believe we are taking appropriate steps to plan for Brexit, due to the uncertainties of how Brexit will be resolved and its accompanying impacts, there can be no assurance that Brexit will not adversely affect our business operations, results of operations and financial condition.

Risks Related to Ingevity's Business

We are dependent on attracting and retaining key personnel.

The Company is dependent upon its senior management, as well as upon engineering, technical, sales and application specialists, together with experienced industry professionals. Our success depends, in part, on our ability to attract, retain and motivate these key performers. Our failure to attract and retain those making significant contributions could adversely affect our financial condition and results of operations.

If increasingly more stringent air quality standards worldwide are not adopted, our growth could be impacted.

Environmental standards drive the implementation of gasoline vapor emission control systems by automotive manufacturers. Given increasing societal concern over global warming and health hazards associated with poor air quality, there is growing pressure on regulators across the globe to take meaningful action. For those countries that have not significantly regulated gasoline vapor emissions, enacting more stringent regulations governing gasoline vapor emissions represents a significant upside to the Company's automotive carbon business. However, regulators

may react to a variety of considerations, including economic and political, that may mean that any such more stringent regulations are delayed or shelved entirely, in one or more countries or regions. As the adoption of more stringent regulations governing gasoline vapor emissions is expected to drive significant growth in our automotive carbon applications, the failure to enact such regulations will have a significant impact on the growth prospects for these products.

Adverse conditions in the automotive market may adversely affect demand for our automotive carbon products.
Sales of our automotive activated carbon products are tied to global automobile production levels. Automotive production in the markets we serve can be affected by macro-economic factors such as interest rates, fuel prices, shifts in vehicle mix (including shifts toward alternative energy vehicles), consumer confidence, employment trends, regulatory and legislative oversight requirements and trade agreements. For example, the global economic downturn in 2008/2009 led to a drastic reduction in vehicle sales and an even greater reduction in vehicle production as OEMs right-sized their inventories to meet the lower sales volumes. Regional disruptions such as those caused by the Japan earthquake and resulting tsunami in March 2011 and Hurricane Sandy in October 2012 can also significantly impact vehicle production and therefore demand for our automotive carbon.
The Company's printing inks business serves customers in a market that is facing declining volumes and downward pricing.
In recent years, the use of inks in which our printing ink resins are used, such as those made for magazines and catalogues, has significantly decreased, as the printing industry has experienced a reduction in demand due to various factors including the global economic downturn of 2008 and 2009, which severely impacted volumes, and competition from alternative sources of communication, including email, the Web, electronic readers, interactive television and electronic retailing. The impacts of these changes have led to continued intense competition and downward pricing pressures on printing inks, and therefore, our ink products.
The Company's pavement technologies business is heavily dependent on government infrastructure spending.
A significant portion of our customers' revenues in our pavement technologies business is derived from contracts with various foreign and U.S. governmental agencies, and therefore, when government spending is reduced, our customers' need for our products is similarly reduced. While we do not do business directly with governmental agencies, our customers provide paving services to, for example, the governments of various jurisdictions within North America, Europe, China, Brazil and India, and revenue either directly or indirectly attributable to such government spending continues to remain a significant portion of our revenues. Government business is, in general, subject to special risks and challenges, including: delays in funding and uncertainty regarding the allocation of funds to federal, state and local agencies, delays in the expenditures and delays or reductions in other state and local funding dedicated for transportation projects; other government budgetary constraints, cutbacks, delays or reallocation of government funding; long purchase cycles or approval processes; our customers' competitive bidding and qualification requirements; changes in government policies and political agendas; and international conflicts or other military operations that could cause the temporary or permanent diversion of government funding from transportation or other infrastructure projects.
The Company's oilfield technologies business is significantly affected by trends in oil and natural gas prices that affect the level of exploration, development and production activity.
Demand for our oilfield technologies services and products is particularly sensitive to the level of exploration, development and production activity of, and the corresponding capital spending by, oil and natural gas companies, including national oil companies. The level of exploration, development and production activity is directly affected by trends in oil and natural gas prices, which historically have been volatile. Crude oil prices have declined significantly since 2014, with West Texas Intermediate oil spot prices declining from a high of $108 per barrel in June 2014 to a low of $27 per barrel in February 2016, a level which had not been experienced since 2003. Pricing has climbed to a trading range of $43 to $64 per barrel in the November 2018 to January 2019 time frame. Pricing is not currently forecasted to change significantly from these levels during 2019. While these pricing levels are significantly above the February 2016 levels, they remain off their highs seen in the last decade.
Any prolonged low pricing environment for oil and natural gas is likely to result in reduced demand for our oilfield technology products, which may have a material adverse effect on our results of operations.
In order to compete successfully, we must develop new products and technologies meeting evolving market and customer needs; disruptive technologies could reduce the demand for the Company's products.
Our industries and the end-use markets into which we sell our products experience periodic technological change and product improvement. Our future growth will depend on our ability to gauge the direction of commercial and

technological progress in key end-use markets and on our ability to fund and successfully develop, manufacture and market products in such changing end-use markets. If we fail to keep pace with the evolving technological innovations in our end-use markets on a competitive basis, including with respect to innovation with regard to the development of alternative uses for, or application of, products developed that utilize such end-use products, our financial condition and results of operations could be adversely affected. Similarly, we face

competition in our applications. Disruptive technology involving new or superior solutions could reduce the demand for the Company’s products.

From time to time we are called upon to protect our intellectual property rights and proprietary information though litigation and other means; if we are unable to successfully protect our rights we may be negatively impacted from a financial as well as competitive advantage standpoint.

Intellectual property rights, including patents, trade secrets, confidential information, trademarks, trade names and trade dress, are important to our business. See "Intellectual Property" included within Part I. Item 1 of this Form 10-K for more information on our “canister bleed emissions” patent. We will endeavor to protect our intellectual property rights in key jurisdictions in which our products are produced or used, in jurisdictions into which our products are imported, and in jurisdictions where our competitors have significant manufacturing capabilities. Our success will depend to a significant degree upon our ability to protect and preserve our intellectual property rights. However, we may be unable to obtain or maintain protection for our intellectual property in key jurisdictions. Although we own and have applied for numerous patents and trademarks throughout the world, we may have to rely on judicial enforcement of our patents and other proprietary rights. Our patents and other intellectual property rights may be challenged, invalidated, circumvented and rendered unenforceable or otherwise compromised. A failure to protect, defend or enforce our intellectual property could have an adverse effect on our financial condition and results of operations. Similarly, third parties may assert claims against us and our customers and distributors alleging our products infringe upon third-party intellectual property rights.

We also rely materially upon unpatented proprietary technology, know-how and other trade secrets to maintain our competitive position. While we maintain policies to enter into confidentiality agreements with our employees and third parties to protect our proprietary expertise and other trade secrets, these agreements may not be enforceable or, even if legally enforceable, we may not have adequate remedies for breaches of such agreements. We also may not be able to readily detect breaches of such agreements. The failure of our patents or confidentiality agreements to protect our proprietary technology, know-how or trade secrets could result in significantly lower revenues, reduced profit margins or loss of market share.

We are currently involved in several legal actions relative to intellectual property associated with our "canister bleed emissions" patent. These and other legal actions to protect, defend or enforce our intellectual property rights could result in significant costs and diversion of our resources and our management’s attention, and we may not prevail in any such suits or proceedings. A failure to protect, defend or enforce our intellectual property rights, or the loss of patent rights due to adverse findings in any claims or proceedings could have an adverse effect on our financial condition and results of operations.

Our Performance Chemicals segment is highly dependent on CTO, which is limited in supply; lack of access to sufficient CTO would impact our ability to produce CTO-based products.

The availability of CTO is essential to the Company’s Performance Chemicals segment. Availability of CTO is directly linked to the production output of kraft mills using pine as their source of pulp, which is the predominant fiber source for packaging grades of paper as well as fluff pulp for personal care products. As a result, there is a finite global supply of CTO-with global demand for kraft board driving the global supply of CTO, rather than demand for CTO itself. Most of the CTO made available for sale by its producers in North America is covered by long-term supply agreements, further constraining availability.

At the time of the Separation, we entered into a long-term supply agreement with WestRock pursuant to which we purchase all of the CTO output from WestRock’s existing (at the time of separation) kraft mills, subject to certain exceptions. This agreement includes pricing terms based on market prices.

Pricing for the products in our agreement with WestRock is based on the prevailing market prices of products at the time of purchase. The pricing formulas are subject to certain pricing floors as set forth in the agreement with WestRock. Given the take-or-pay requirements of the agreement with WestRock, in adverse market conditions we could be required to purchase CTO from WestRock at prices where our results of operations could be materially and adversely affected.

In 2018, we entered into a 20 year CTO supply agreement with Georgia-Pacific, pursuant to which we purchase the lesser of 125,000 tons of CTO and the aggregate output of CTO produced and originating at certain of Georgia-Pacific's paper mills.

Pricing for the CTO in our agreement with Georgia-Pacific is a market-based price, subject to ongoing adjustments. Given the take-or-pay requirements of the agreement with Georgia-Pacific, in adverse market conditions we could be required to purchase CTO from Georgia-Pacific at prices where our results of operations could be materially and adversely affected.

If any of our suppliers (including WestRock or Georgia-Pacific) fail to meet their respective obligations under our supply agreements or we are otherwise unable to procure an adequate supply of CTO, we would be unable to maintain our current level of production and our results of operations would be materially and adversely affected.

Beginning in 2025, either party to the WestRock agreement may provide a notice to the other party terminating the WestRock agreement five years from the date of such notice. Beginning one year after such notice, the quantity of products provided by WestRock under the agreement will be gradually reduced over a four-year period based on the schedule set forth in the agreement. In addition, from 2022 until 2025, either party may provide a one-year notice to remove a kraft mill as a supply source. The two largest kraft mills under the WestRock agreement currently supply approximately 19 to 20 percent and 17 to 18 percent, respectively, of the total amount of products supplied under our agreement with WestRock. If WestRock exercises its rights to terminate the agreement or remove a kraft mill as a supply source, and we are unable to arrange for a substitute supply of CTO, we would be unable to continue to produce the same quantity of products and our results of operations could be materially and adversely affected.

There are other pressures on the availability of CTO. Some pulp or paper mills may choose to consume their production of CTO to meet their energy needs rather than sell the CTO to third parties. Also, as described below, there are regulatory pressures that may incentivize suppliers of CTO to sell CTO into alternative fuel markets rather than to historical end users such as Ingevity. Furthermore, weather conditions have in the past and may in the future affect the availability and quality of pine trees used in the kraft pulping process and therefore the availability of CTO meeting Ingevity's quality standards. For example, the combined impact of Hurricane Katrina in August 2005 and Hurricane Rita in September 2005 caused significant damage to forests throughout the southern U.S.. This significantly affected the availability and quality of the supply of CTO during late 2005 and into 2006. In addition, Hurricanes Florence and Michael in 2018 disrupted vendor operations and reduced availability of CTO supply.

We may not realize the growth opportunities that are anticipated from the Caprolactone Acquisition.

The benefits that are expected to result from the Caprolactone Acquisition will depend, in part, on our ability to realize the anticipated growth opportunities. Our success in realizing these growth opportunities, and the timing of this realization, depends on the successful integration of the Caprolactone Business. There is a significant degree of difficulty and management distraction inherent in the process of integrating an acquisition as sizable as the Caprolactone Business. The process of integrating operations could cause an interruption of, or loss of momentum in, our and the Caprolactone Business' activities. Members of our senior management may be required to devote considerable amounts of time to this integration process, which will decrease the time they will have to manage other aspects of our business, service existing customers, attract new customers and develop new products or strategies. If senior management is not able to effectively manage the integration process, or if any significant business activities are interrupted as a result of the integration process, our business could suffer. There can be no assurance that we will successfully or cost-effectively integrate the Caprolactone Business. The failure to do so could have a material adverse effect on our business, financial condition or results of operations.

Even if we are able to integrate the Caprolactone Business successfully, this integration may not result in the realization of the full benefits of the growth opportunities that we currently expect from this integration, and we cannot guarantee that this benefit will be achieved within anticipated time frames or at all. For example, the associated costs of the Caprolactone Acquisition may be greater than we expect. Any of these would offset the anticipated benefit from the Caprolactone Acquisition.

The Caprolactone Acquisition may expose us to unknown liabilities.

On February 13, 2019, we acquired all the shares of Perstorp UK Ltd. and, as a result, we will generally be subject to all of its liabilities, subject to a warranty and indemnity insurance policy and remedies in the Caprolactone Agreement. We may learn additional information about the Caprolactone Business that adversely affects us, such as unknown liabilities, including liabilities under environmental or tax laws, or issues that could affect our ability to comply with other applicable laws. If previously unknown liabilities or other obligations of the Caprolactone Business emerge in the future, and available remedies are not sufficient, our business could be materially affected.

The European Union's Directive 2009/28 on the promotion of the use of energy from renewable resources ("Renewable Energy Directive" or "RED") and similar legislation in the U.S. and elsewhere may incentivize the use of CTO as a feedstock for production of alternative fuels.

In December 2008, the European Union ("EU") adopted the Renewable Energy Directive, which established a 20 percent EU-wide target for energy consumed from renewable sources relative to the EU's gross final consumption of energy, as well as a 10 percent target for energy consumed from renewable sources in the transport section. In order to reach these targets, the RED established mandatory targets for each Member State and required each Member State to adopt a national renewable energy action plan setting forth measures to achieve its national targets. The RED also established sustainability criteria for biofuels, which must be satisfied in order for the consumption of a fuel to count toward a Member State's national targets. CTO-based biofuel currently satisfies the RED's biofuel sustainability criteria.

In spring 2015, the EU adopted amendments to the Renewable Energy Directive. RED now expressly lists CTO as a residue-type feedstock whose use in biofuel would make that biofuel eligible for double counting towards national targets of the Member States, and at least two Member States additionally have or plan fiscal incentives for the domestic marketing of CTO-based and other qualifying biofuels. In 2018, the EU adopted RED II (effective 2021-2030) which increased the target for energy consumed from renewable sources in the transport section to 14 percent and established minimum use levels for certain feedstocks that may promote the use of CTO for the production of alternative fuels.

In addition to these developments in the European Union, various pieces of legislation regarding the use of alternative fuels have been introduced in the U.S. Currently, none of the U.S. legislation mandates or provides incentives for the use of CTO as a transportation fuel. Some regional cap and trade programs may incentivize the use of CTO in stationary sources. Future legislation in the U.S. and elsewhere may promote the use of CTO as a feedstock for production of alternative fuels.

Because the supply of CTO is inherently constrained by the volume of kraft pulp processing, any diversion of CTO for production of alternative fuels would reduce the available supply of CTO as the principal raw material of the pine chemicals industry. As described above, the Company is highly dependent on CTO as an essential raw material, and if the Company is unable to procure an adequate supply of CTO due to competing new uses such as for biofuel production, the Company's results of operations would be materially and adversely affected.

Pricing for CTO is subject to particular pricing pressures by reason of limited supply and competing demands for end use, and we may be limited in our ability to pass on increased costs to our customers.

Pricing for CTO (which accounted for approximately 12 percent of all of our cost of sales and 34 percent of our raw materials purchases for 2018) is subject to particular pricing pressures by reason of the limited supply elasticity of the product and competing demands for its use, all of which drive pressure on price:

- CTO is a product of the kraft pulping process, and the global supply of CTO is inherently constrained by the volume of kraft pulping processing;
- CTO can be burned as alternative fuels, either in support of the originating pulp mill operations, by energy companies or biofuel companies; and
- Regulations or other incentives mandate or encourage the consumption of biofuels as alternatives, including CTO.

We may not have the ability to pass through any increases in our cost of CTO to our customers in the form of price increases or other adjustments, with a resulting material adverse effect on our results of operations. Additionally, we may be placed at a competitive disadvantage relative to our competitors who rely on different primary raw materials or who have more favorable terms with their suppliers.

We are also dependent on other raw materials, and these are also subject to pricing pressures; lack of access to these raw materials and inability to pass on price increases could adversely affect our financial condition and results of operations.

The Company is dependent on other raw materials, including, but not limited to, hardwood sawdust, phosphoric acid, ethylene amines, lignin, nonylphenol, hydrogen peroxide, cyclohexanone, and pentaerythritol. Raw material costs are a significant operating expense of the Company. The cost of raw materials can be volatile and subject to increases as a result of, among other things, changing economic conditions, political or policy considerations, supply and demand levels, instability in energy producing nations, and natural events such as extreme weather events or even insect infestations. Any interruption in the supply of the raw materials on which we depend, and any increases in the cost of raw materials that we are not able to pass on to customers in the form of price increases or other adjustments, may materially impact our financial condition and results of operations.

A prolonged period of low energy prices may materially impact our results of operations.

The price of energy may directly or indirectly impact demand, pricing or the profitability for certain Ingevity products. As petroleum oil prices fall or change rapidly, Ingevity products may be disadvantaged due to the fact that CTO and BLSS are thinly traded commodities with pricing commonly established for periods ranging from one quarter to one year periods of time. Due to this, alternative technologies which compete with product offerings provided by Ingevity may be advantaged from time to time in the market place. Protracted periods of high volatility or sustained oversupply of petroleum oil may also translate into increased competition from petroleum-based alternatives which would otherwise be consumed in petroleum transportation fuel blends. In addition, pricing for competing naturally derived oils such as palm or soybean is likely to provide further pressure on pricing of the Company’s products during periods of depressed petroleum prices.

We face competition from producers of substitute products and new technologies, and new or emerging competitors.

In the Performance Materials segment, there is competition from various other activated carbon manufacturers. These competitors are actively trying to develop more advanced and alternative activated carbon products that would more effectively compete with our products in the automotive applications. There is also competition in the automotive applications from non-activated carbon competitors or product offerings. For example, at least one OEM is using sealed tanks in certain subsets of its vehicles to comply with the LEV III/Tier 3 regulations. While the sealed tank fuel systems generally require a similarly sized pelleted activated carbon canister to deal with refueling emissions, in most cases, they do not use a extruded honeycomb to meet current U.S. and California regulations. There is also emerging competition in the "honeycomb" space, which may impact sales of the Company's products. If a competitor were to succeed in developing products that are better suited for automotive evaporative emissions capture applications and/or a competitive technology, such as, but not limited to, sealed gas tanks, were to be implemented across a material number of vehicle platforms, our financial results could be negatively impacted.

In addition, growth in alternative vehicles, such as all-electric vehicles and hydrogen fuel cell vehicles, which do not use gasoline, may also adversely affect the demand for our products.

In the Performance Chemicals segment, hydrocarbon resins and gum rosin-based products compete with TOR-based resins in the adhesives and printing inks markets. The price of gum rosin has a significant impact on the market price for TOR and rosin derivatives and the price of gum rosin is driven by labor rates, land leasing costs and various other factors that are not within our control. Hydrocarbon resins, for example, C5 resins, are co-products from isoprene (synthetic rubber). Availability and pricing are determined by the supply and demand for synthetic rubber as well as crude oil prices as the feedstock for isoprene and various other factors that are not within our control. Animal and vegetable-based fatty acids compete with TOFA products in lubricant and industrial specialties. The market price for TOFA products is impacted by the prices of other fats and oils and the prices for other fats and oils is driven by actual and expected harvest rates, crude oil prices and the biofuel market. Other monomers, thermoplastics and polyols compete with our caprolactone based products. The price for our products is impacted by the prices of competitive substitutes which are influenced by petroleum prices as well as other supply and demand factors. Additionally, the Company faces competition from competitors that are actively developing new technologies and competing products across the segment. A significant investment by a competitor in a competitive technology or product line could

negatively impact our financial results.

We face competition from infringing intellectual property activity.

The Company is currently involved in several legal actions relative to intellectual property associated with our “canister bleed emissions” patent. These infringing activities also represent a competitive threat. The Company is vigorously addressing infringing activity through legal actions and other available means. While the Company believes its legal action claims are meritorious, there can be no assurances that the Company will prevail in such actions.

Disruptions at any of our manufacturing facilities or within our supply chain could negatively impact our production, financial condition and results of operations.

An operational disruption in any of our facilities could negatively impact production and our financial results. The occurrence of a natural disaster, such as a hurricane, tropical storm, earthquake, tornado, severe weather, flood, fire or other unanticipated problems such as labor difficulties, equipment failure, capacity expansion difficulties or unscheduled maintenance could cause operational disruptions of varied duration. These types of disruptions could materially adversely affect our financial condition and results of operations to varying degrees dependent upon the facility, the duration of the disruption, our ability to shift business to another facility or find alternative sources of materials or energy. In certain cases, we have some products that are only made at one facility. For example, in the case of our Waynesboro, Georgia facility, while we have some redundancies within the facility, we only have one facility that makes our extruded honeycomb products. In the case of our Warrington, UK facility, while we have some redundancies within the facility, we only have one facility that makes our caprolactone products. As other examples, in our Charleston SC facility, we source black liquor from an adjacent papermill to isolate and subsequently modify lignin to serve our agriculture customers while we make the vast majority of our ink resin products in our DeRidder, Louisiana facility. While we have redundancies within these facilities, we have limited ability to make these products at other facilities. Any losses due to these events may not be covered by our existing insurance policies or may be subject to certain deductibles.

We could be similarly adversely affected by disruptions within our supply chain and transportation network. Our products are transported by truck, rail, barge or ship by third-party providers. The costs of transporting our products could be negatively affected by factors outside of our control, including rail service interruptions or rate increases, extreme weather events, tariffs, rising fuel costs and capacity constraints. Significant delays or increased costs affecting these transportation methods could materially affect our financial condition and results of operations.

Disruptions at our suppliers could lead to short term or longer rises in raw material or energy costs and/or reduced availability of materials or energy, potentially affecting our financial condition and results of operations. For example Solvay Interox Limited (“Solvay”) is our primary provider of hydrogen peroxide to our Warrington, UK Performance Chemicals facility, which is co-located with the Solvay Warrington, UK chemical plant (“Solvay Plant”). Disruptions at the Solvay Plant impacting Solvay’s ability to supply hydrogen peroxide could adversely affect our financial condition and results of operations. See also "Our Engineered Polymers product line may be adversely affected by Brexit" risk factor.

We are dependent upon third parties for the provision of certain critical operating services at several of our facilities.

We are dependent upon third parties for the provision of certain critical operating services at our Covington, Virginia Performance Materials facility and at the following Performance Chemicals facilities: Crossett, Arkansas; North Charleston, South Carolina; and Warrington, UK.

We are dependent on: (i) the WestRock Covington, Virginia paper mill (“WestRock VA Paper Mill”) for the provision of electricity, water, compressed air, steam and wastewater treatment to our Covington Performance Materials facility; (ii) the WestRock North Charleston, South Carolina paper mill (“WestRock SC Paper Mill”) for the provision of water, compressed air, steam and wastewater treatment at our North Charleston Performance Chemicals facility; (iii) the Georgia-Pacific Crossett, Arkansas paper mill and chemicals plant (collectively, “Georgia-Pacific Mill”) for the provision of natural gas, water, compressed air and wastewater treatment to our Crossett Performance Chemicals facility; and (iv) Solvay Plant for the provision of water, compressed air, nitrogen, natural gas, electricity, steam, and wastewater treatment and waste management at our Warrington Performance Chemicals facility. We have existing long-term contractual arrangements covering these services for our Covington, Crossett, North Charleston and Warrington facilities. The provision of these services would be at risk if any of the counterparties were to idle or permanently shut down the associated mill, or if operations at the associated mill were disrupted due to natural or other disaster, or by reason of strikes or other labor disruptions, or if there were a significant contractual dispute between the parties.

In the event that WestRock VA Paper Mill, WestRock SC Paper Mill, Georgia-Pacific Mill or Solvay Plant were to fail to provide the contracted services, we would be required to obtain these services from other third parties at an

increased cost or to expend capital to provide these services ourselves. The expenses associated with obtaining or providing these services, as well as any interruption in our operations as a result of the failure of the counterparty to provide these services, may be significant and may adversely affect our financial condition and results of operations. Furthermore, in the event that WestRock VA Paper Mill wastewater treatment operations do not comply with permits or applicable law and the WestRock VA Paper Mill is unable to determine the cause of such compliance, then we will be responsible for between 10 percent and 50 percent of the costs and expenses of such noncompliance (increasing in 10 percent increments per

violation during each twelve month period) despite representing less than 3 percent of the total wastewater volume. These costs and expenses may be significant and may adversely affect our financial condition and results of operations.

Additionally, (i) our Covington Performance Materials facility is located on real property leased from WestRock pursuant to a long-term lease agreement, and is surrounded by the WestRock VA Paper Mill, (ii) a portion of our North Charleston Performance Chemicals facility is located on real property leased from WestRock and is adjacent to the WestRock SC Paper Mill; (iii) our Crossett Performance Chemicals facility is located on real property leased from Georgia-Pacific pursuant to a long-term lease agreement, and is surrounded by the Georgia-Pacific Paper Mill and (iv) our Warrington, UK Performance Chemicals facility is located on real property leased from Solvay pursuant to multiple long-term lease agreements, and is surrounded by the Solvay Plant. In the event we were to have a dispute with WestRock, Georgia-Pacific or Solvay regarding the terms of the relevant lease agreements, or we were otherwise unable to fully access or utilize the leased property, the associated business disruption may be significant and may adversely affect our financial condition and results of operations.

We are also dependent on third parties for the disposal of brine, which results from our own conversion of BLSS into CTO. If these service providers do not perform under their contracts, the costs of disposing of brine ourselves, including, for example, the transportation costs, could be significant.

Work stoppages and other labor relations matters may have an adverse effect on our financial condition and results of operations.

Many of our production employees are governed by collective bargaining agreements ("CBAs"). From time to time the Company engages in negotiations to renew CBAs as those contracts are scheduled to expire. At our North Charleston, SC facility, the Company ratified a new CBA with the USW and IAM in 2018 and with the IBEW in January 2019. While the Company has generally positive relations with its labor unions, there is no guarantee the Company will be able to successfully negotiate new union contracts without work stoppages, labor difficulties or unfavorable terms. If we were to experience any extended interruption of operations at any of our facilities because of strikes or other work stoppages, our results of operations and financial condition could be materially and adversely affected. In addition, due to the co-location of our Covington, Crossett, North Charleston, and Warrington facilities within the WestRock VA Paper Mill, Georgia-Pacific Mill, WestRock SC Paper Mill and Solvay Plant facilities, a strike or work stoppage at any of these facilities could cause disruptions at our facilities, and our results of operations could be materially and adversely affected.

Our business involves hazards associated with chemical manufacturing, storage, transportation and disposal.

There are hazards associated with the chemicals we manufacture and the related storage and transportation of our raw materials, including common solvents, such as toluene and methanol, and reactive chemicals, such as acrylic acid, all of which fall under the OSHA Process Safety Management Code. These hazards could lead to an interruption or suspension of operations and have an adverse effect on the productivity and profitability of a particular manufacturing facility or on us as a whole. While we endeavor to provide adequate protection for the safe handling of these materials, issues could be created by various events, including natural disasters, severe weather events, acts of sabotage and performance by third parties, and as a result we could face the following potential hazards: piping and storage tank leaks and ruptures; mechanical failure; employee exposure to hazardous substances; and chemical spills and other discharges or releases of toxic or hazardous substances or gases.

These hazards may cause personal injury and loss of life, damage to property and contamination of the environment, which could lead to government fines, work stoppage injunctions, lawsuits by injured persons, damage to our public reputation and brand and diminished product acceptance. If such actions are determined adversely to us or there is an associated economic impact to our business, we may have inadequate insurance or cash flow to offset any associated costs. Such outcomes could adversely affect our financial condition and results of operations.

Regulation of exposure to certain process chemicals could require expenditures or changes to our product formulations.

Certain regulations applicable to our operations, including the Occupational Safety and Health Act and the Toxic Substances Control Act in the U.S. and the Registration, Evaluation and Authorization of Chemicals, or REACH, directive in Europe, prescribe limits restricting exposure to a number of chemicals used in our operations, including certain forms of formaldehyde, a raw material used in the manufacture of phenolic modified rosin-based ink resins and some lignin-based dispersants. Future studies on the health effects of chemicals used in our operations, including alkylphenols, such as bisphenol A, which are used in our TOR-based ink resins, may result in additional regulation or new requirements in the U.S., Europe and elsewhere, which might further restrict or prohibit the use of, and exposure to, these chemicals. Additional regulation of or requirements for these or other chemicals could require us to change our operations, and these changes could affect the quality or types of products we manufacture and/or materially increase our costs.

The Company's operations are subject to a wide range of general and industry-specific environmental laws and regulations.

The Company's operations are subject to a wide range of general and industry-specific environmental laws and regulations, including, for example, related to bisphenol A, formaldehyde and air emissions. Changes in environmental laws and regulations, or their application, could subject the Company to significant additional capital expenditures and operating expenses in future years. However, any such changes are uncertain and, therefore, it is not possible for the Company to predict with certainty the amount of additional capital expenditures or operating expenses that could be necessary for compliance with respect to any such changes.

As we rely on information technologies to conduct our business, security breaches and other disruptions could compromise our information and expose us to liability, which could cause our business and reputation to suffer.

We rely on information technologies, some of which are managed by third parties, to manage the day-to-day operations and activities of our business, operate elements of our manufacturing facilities, manage our customer and vendor transactions, and maintain our financial, accounting and business records. In addition, we collect and store certain data, including proprietary business information, and may have access to confidential or personal information that is subject to privacy and security laws and regulations.

The secure processing, maintenance and transmission of sensitive, confidential and personal data is critical to our operations and business strategy. We follow industry best practices and have instituted a system of security policies, procedures, capabilities, and internal controls designed to protect this information. Additionally, we engage third-party threat detection and monitoring services which includes a global cyber security incident response team. Despite our security design and controls, and those of our third-party providers, we may be vulnerable to cyber-attacks, computer viruses, security breaches, inadvertent or intentional employee actions, system failures and other risks that could potentially lead to the compromising of sensitive, confidential or personal data, improper use of our, or our third-party provider systems, solutions or networks, unauthorized access, use, disclosure, modification or destruction of information, and operational disruptions. In addition, the global regulatory environment pertaining to information security and privacy is increasingly demanding, with new and changing requirements, such as the European Union's General Protection Regulation ("GDPR") and the China Cybersecurity Law. GDPR, which applies to the collection, use, retention, security, processing, and transfer of personally identifiable information of residents of EU countries, mandates new compliance obligations, and imposes significant fines and sanctions for violations. Such breaches, cyber incidents and disruptions, or failure to comply with laws and regulations related to information security or privacy, could result in legal claims or proceedings against us by governmental entities or individuals, significant fines, penalties or judgements, disruption of our operations, remediation requirements, changes to our business practices, and damage to our reputation, which could adversely affect our business, financial condition or results of operations.

We are dependent on certain customers.

We have certain large customers in particular businesses, the loss of which could have a material adverse effect on the applicable segment's sales and, depending on the significance of the loss, our results of operations, financial condition

or cash flows. Sales to the Company's ten largest customers (across both segments) accounted for 36 percent of total sales for 2018. No customer accounted for more than 10 percent of total sales for 2018. With some exceptions, our business with those large customers is based primarily upon individual purchase orders. As such, our customers could cease buying our products from us at any time, for any reason, with little or no recourse. If a major customer or multiple smaller customers elected not to purchase products from us, our financial condition and results of operations would be materially adversely affected.

Challenges in the commercial and credit environment may materially adversely affect Ingevity's future access to capital.

Ingevity's ability to issue debt or enter into other financing arrangements on acceptable terms could be materially adversely affected if there is a material decline in the demand for Ingevity's products or in the solvency of its customers or suppliers or if other significantly unfavorable changes in economic conditions occur. Volatility in the world financial markets could increase borrowing costs or affect Ingevity's ability to gain access to the capital markets, which could have a material adverse effect on Ingevity's competitive position, business, financial condition, results of operations and cash flows.

Our current level of debt could adversely affect our financial health and prevent us from fulfilling our debt obligations.

Our debt requires significant interest and principal payments. Our ability to make scheduled payments on or to refinance our debt obligations and to fund working capital, planned capital expenditures and expansion efforts and any strategic alliances or acquisitions we may make in the future depends on our ability to generate cash in the future and our financial condition and operating performance, which are subject to prevailing economic and competitive conditions and to certain financial, business, regulatory and other factors beyond our control. There can be no assurance that we will maintain a level of cash flows from operating activities sufficient to permit us to pay the principal, premium, if any, and interest on our debt.

If our cash flows and capital resources are insufficient to fund our debt service obligations, we may be forced to reduce or delay investments and capital expenditures, or to sell assets, seek additional capital or restructure or refinance our debt, including the notes. These alternative measures may not be successful and may not permit us to meet our scheduled debt service obligations. If our operating results and available cash are insufficient to meet our debt service obligations, we could face substantial liquidity problems and might be required to dispose of material assets or operations to meet our debt service and other obligations. We may not be able to consummate those dispositions or to obtain the proceeds sought from them, and these proceeds may not be adequate to meet any debt service obligations then due. Further, we may need to refinance all or a portion of our debt on or before maturity, and there can be no assurances we will be able to refinance any of our debt on commercially reasonable terms or at all. Any inability to generate sufficient cash flow or refinance our indebtedness on favorable terms could have a material adverse effect on our business, results of operations, and financial condition.

The inability to make or effectively integrate future acquisitions may affect our results.

As part of our growth strategy, we may pursue acquisitions of complementary businesses and product lines or invest in joint ventures. The ability to grow through acquisitions or other investments depends upon our ability to identify, negotiate, complete and integrate suitable acquisitions or joint venture arrangements. If we fail to successfully integrate acquisitions into our existing business, our financial condition and results of operations could be adversely affected.

We are subject to continuing contingent tax-related liabilities of WestRock.

Under the U.S. Internal Revenue Code of 1986, as amended (the "Code"), each corporation that was a member of WestRock's consolidated tax reporting group during any taxable period or portion of any taxable period ending on or before the effective time of the distribution is severally liable for the U.S. federal income tax liability of the entire consolidated tax reporting group for such taxable period. In connection with the Separation, we entered into the tax matters agreement with WestRock (the "Tax Matters Agreement") that allocates the responsibility for prior period taxes of WestRock's consolidated tax reporting group between Ingevity and WestRock. If WestRock were unable to pay any prior period taxes for which it is responsible, however, we could be required to pay the entire amount of such taxes, and such amounts could be significant. The Tax Matters Agreement generally gives WestRock discretion to handle consolidated tax returns and audits for pre-distribution periods in a manner which may be unfavorable to us and which may result in additional tax costs to us.

Our tax rate is dependent upon a number of factors; a change in any of which could impact our future tax rates and net income.

Our future tax rates may be adversely affected by a number of factors, including: future changes in the jurisdictions in which our profits are determined to be earned and taxed; changes in estimated realization of our deferred tax assets; the repatriation of non-U.S. earnings for which we have not previously provided U.S. income and non-U.S. withholding taxes; adjustments to estimated taxes upon finalization of various tax returns; increases in expenses that are non-deductible for tax purposes; changes in available tax credits; the resolution of issues arising from tax audits with various tax authorities; and changes in tax laws or interpretation of such tax laws. Losses for which no tax benefits can be recorded could materially impact our tax rate and its volatility from one quarter to another.

Risks Relating to Ingevity’s Common Stock

The price of Ingevity’s common stock may fluctuate significantly.

The market price of Ingevity common stock may fluctuate significantly due to a number of factors, some of which may be beyond Ingevity’s control, including:

- actual or anticipated fluctuations in Ingevity’s operating results;
- changes in earnings estimated by securities analysts or Ingevity’s ability to meet those estimates;
- the operating and stock price performance of comparable companies;
- changes to the regulatory and legal environment under which Ingevity operates; and
- domestic and worldwide economic conditions.

We cannot guarantee the timing, amount or payment of any dividends on our common stock in the future.

The payment and amount of any dividend is subject to the sole discretion of our board of directors and will depend upon many factors, including our financial condition and prospects, our capital requirements and access to capital markets, covenants associated with certain of our debt obligations, legal requirements and other factors that our board of directors may deem relevant, and there can be no assurances that we will pay a dividend.

Your percentage of ownership in Ingevity may be diluted in the future.

A stockholder's percentage ownership in Ingevity may be diluted because of equity issuances for acquisitions, capital market transactions or otherwise, including, without limitation, equity awards that we may be granting to our directors, officers and employees. Such awards will have a dilutive effect on Ingevity’s earnings per share, which could adversely affect the market price of Ingevity’s common stock. From time to time, Ingevity will issue additional options or other stock-based awards to certain employees under Ingevity’s employee benefits plans.

In addition, Ingevity’s amended and restated certificate of incorporation authorizes Ingevity to issue, without the approval of Ingevity’s stockholders, one or more classes or series of preferred stock having such designation, powers, preferences and relative, participating, optional and other special rights, including preferences over Ingevity’s common stock respecting dividends and distributions, as Ingevity’s board of directors generally may determine. The terms of one or more classes or series of preferred stock could dilute the voting power or reduce the value of Ingevity’s common stock. For example, Ingevity could grant the holders of preferred stock the right to elect some number of Ingevity’s directors in all events or on the happening of specified events or the right to veto specified transactions. Similarly, the repurchase or redemption rights or liquidation preferences Ingevity could assign to holders of preferred stock could affect the residual value of the common stock.

Certain provisions in Ingevity’s amended and restated certificate of incorporation and amended and restated bylaws, and of Delaware law, may prevent or delay an acquisition of Ingevity, which could depress the trading price of Ingevity’s common stock.

Ingevity’s amended and restated certificate of incorporation and amended and restated bylaws contain, and Delaware law contains, provisions that are intended to deter coercive takeover practices and inadequate takeover bids by making such practices or bids unacceptably expensive to the bidder and to encourage prospective acquirers to negotiate with Ingevity’s board of directors rather than to attempt a hostile takeover. These provisions include, among others:

- the inability of Ingevity’s stockholders to act by written consent;
- rules regarding how stockholders may present proposals or nominate directors for election at stockholder meetings;
- the right of Ingevity’s board to issue preferred stock without stockholder approval;
- the ability of Ingevity’s remaining directors to fill vacancies on Ingevity’s board of directors;
- the inability of Ingevity’s stockholders to remove directors other than for cause while the board is classified; and
- the requirement that the affirmative vote of holders of at least 75 percent of Ingevity’s outstanding voting stock is required to amend certain provisions of Ingevity’s amended and restated certificate of incorporation and amended and restated bylaws (Supermajority Amendment Provisions").

On November 1, 2018, the Board of Directors approved amendments to Ingevity's amended and restated certificate of incorporation and amended and restated bylaws to remove the Supermajority Amendment Provisions and submitted the charter amendment for approval at the Company's 2019 Annual Meeting of Stockholders. To pass, 75 percent of Ingevity's outstanding voting stock must vote in favor of the amendment.

In addition, because Ingevity has not chosen to be exempt from Section 203 of the Delaware General Corporation Law (the "DGCL"), this provision could also delay or prevent a change of control that you may favor. Section 203 provides that, subject to limited exceptions, persons that acquire, or are affiliated with persons that acquire, more than 15 percent of the outstanding voting stock of a Delaware corporation shall not engage in any business combination with that corporation, including by merger, consolidation or acquisitions of additional shares, for a three-year period following the date on which that person or its affiliates becomes the holder of more than 15 percent of the corporation's outstanding voting stock.

Ingevity believes these provisions will protect its stockholders from coercive or otherwise unfair takeover tactics by requiring potential acquirers to negotiate with Ingevity's board of directors and by providing Ingevity's board of directors with more time to assess any acquisition proposal. These provisions are not intended to make Ingevity immune from takeovers. However, these provisions will apply even if the offer may be considered beneficial by some stockholders and could delay or prevent an acquisition that Ingevity's board of directors determines is not in the best interests of Ingevity and Ingevity's stockholders. These provisions may also prevent or discourage attempts to remove and replace incumbent directors.

There could be significant liability if the Separation were determined to be a taxable transaction.

In connection with the Separation, our former parent received an opinion from outside tax counsel to the effect that the requirements for tax-free treatment under Section 355 of the Code would be satisfied. The opinion relied on certain facts, assumptions, representations and undertakings from our former parent and us regarding the past and future conduct of the companies' respective businesses and other matters. If any of these facts, assumptions, representations or undertakings were incorrect or not satisfied, we and our stockholders may not be able to rely on the opinion of tax counsel and could be subject to significant tax liabilities.

Notwithstanding the opinion of tax counsel, the IRS could determine upon audit that the Separation is taxable if it determines that any of these facts, assumptions, representations or undertakings were incorrect or violated or if it disagrees with the conclusions in the opinion, or for other reasons, including as a result of certain significant changes in the share ownership of our company or our former parent after the Separation. If the Separation were determined to be taxable for U.S. federal income tax purposes, our former parent and its stockholders that are subject to U.S. federal income tax could incur significant U.S. federal income tax liabilities, and we could incur significant liabilities.

Ingevity's amended and restated bylaws designate the state courts within the State of Delaware as the sole and exclusive forum for certain types of actions and proceedings that may be initiated by Ingevity's stockholders, which could discourage lawsuits against Ingevity and Ingevity's directors and officers.

Ingevity's amended and restated bylaws provide that unless the board of directors otherwise determines, a state court within the State of Delaware will be the sole and exclusive forum for any derivative action or proceeding brought on behalf of Ingevity, any action asserting a claim of breach of a fiduciary duty owed by any director of officer of Ingevity to Ingevity or Ingevity's stockholders, creditors or other constituents, any action asserting a claim against Ingevity or any director or officer of Ingevity arising pursuant to any provision of the DGCL, or Ingevity's amended and restated certificate of incorporation or bylaws, or any action asserting a claim against Ingevity or any director or officer of Ingevity governed by the internal affairs doctrine. However, if no state court located within the State of Delaware has jurisdiction, the action may be brought in the federal district court for the District of Delaware. Although Ingevity's amended and restated bylaws include this exclusive forum provision, it is possible that a court could rule that this provision is inapplicable or unenforceable. This exclusive forum provision may limit the ability of Ingevity's stockholders to bring a claim in a judicial forum that such stockholders find favorable for disputes with Ingevity or Ingevity's directors or officers, which may discourage such lawsuits against Ingevity and Ingevity's directors and officers. Alternatively, if a court were to find this exclusive forum provision inapplicable to, or unenforceable in respect of, one or more of the specified types of actions or proceedings described above, Ingevity

may incur additional costs associated with resolving such matters in other jurisdictions, which could adversely affect Ingevity's business, financial condition or results of operations.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We are headquartered in North Charleston, South Carolina and operate manufacturing facilities in the U.S., United Kingdom, and People's Republic of China and warehouse and distribution facilities globally. The following locations represent the principal properties of Ingevity. We believe these facilities are adequate and suitable for our current operations, and that the production capacity of our facilities is sufficient to meet current demand. In the case of the properties identified as “Leased”, we nevertheless own the manufacturing assets themselves.

	Own / Lease	Functional Use
North Charleston, South Carolina	Own / Lease [1]	Corporate Headquarters; Application Labs; Performance Chemicals: Manufacturing
Covington, Virginia	Lease	Performance Materials: Manufacturing
Crossett, Arkansas	Lease	Performance Chemicals: Manufacturing
DeRidder, Louisiana	Own	Performance Chemicals: Manufacturing
Waynesboro, Georgia	Own[2]	Performance Materials: Manufacturing
Wickliffe, Kentucky	Lease	Performance Materials: Manufacturing
Changshu, People’s Republic of China	Lease	Performance Materials: Manufacturing
Warrington, United Kingdom [3]	Lease	Performance Chemicals: Manufacturing, Application Lab
Zhuhai, People’s Republic of China	Lease	Performance Materials: Manufacturing, Application Lab

(1) Portions of the manufacturing operations are on leased land.

(2) Certain manufacturing assets are subject to a capital lease with the Development Authority of Burke County (the county in which Waynesboro, Georgia is located).

(3) Acquired on February 13, 2019 as part of the Caprolactone Acquisition.

ITEM 3. LEGAL PROCEEDINGS

We are from time to time, involved in routine litigation incidental to our operations. None of the litigation in which we are currently involved, individually or in the aggregate, is material to our combined financial condition or results of operations nor are we aware of any material pending or contemplated proceedings.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

EXECUTIVE OFFICERS OF THE REGISTRANT

The executive officers of Ingevity Corporation, the offices they currently hold, their business experience over the past five years and their ages are as follows:

Name	Age (1)	Present Position and Business Experience
D. Michael Wilson	56	President, Chief Executive Officer and Director (2015-present); Executive Vice President & President of Performance Chemicals of Albemarle (2015); President of Albemarle's Catalyst Solutions business (2013-2014); President of FMC's Specialty Chemicals group (2011-2013)
John C. Fortson	51	Executive Vice President, Chief Financial Officer & Treasurer (2015-present); Vice President, Chief Financial Officer and Treasurer of AAR Corporation (2013-2015); Managing Director in the Investment Banking Department of Bank of America Merrill Lynch (2007-2013)
Katherine P. Burgeson	61	Executive Vice President, General Counsel & Secretary (2015-present); Associate General Counsel of WestRock (2015); Deputy General Counsel of MeadWestvaco (2006-2015)
Michael P. Smith	58	Executive Vice President & President of Performance Chemicals, Strategy and Business Development (2017-present); Senior Vice President Strategy and Business Development (2016-2017), Vice President of Health and Nutrition at FMC Corporation (2013-2015); Division General Manager of BioPolymer at FMC Corporation (2006-2013)
S. Edward Woodcock	53	Executive Vice President & President of Performance Materials (2015-present); Vice President of MeadWestvaco's Carbon Technologies business (2010-2015)

(1) As of December 31, 2018.

All officers are elected to hold office for one year or until their successors are elected and qualified. No family relationships exist among any of our executive officers or directors, and there are no arrangements or understandings between any of the above-listed officers and any other person pursuant to which they serve as an officer.

PART II

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

Market for Registrant's Common Equity and Related Stockholder Matters

Ingevity's common stock ($0.01 par value) is listed on the New York Stock Exchange, Inc. ("NYSE") under the symbol "NGVT." There were approximately 6,100 record holders of our common stock as of February 19, 2019.

Unregistered Sales of Equity Securities

Not Applicable.

Issuer Purchases of Equity Securities

The following table summarizes information with respect to the purchase of our common stock during the three months ended December 31, 2018.

			Publicly Announced Program [1]		
Period	Total Number of Shares Purchased	Average Price Paid Per Share	Total Number of Shares Repurchased	Total Dollar Amount Purchased	Maximum Dollar Value of Shares that May Yet be Purchased
October 1-31, 2018	34,500	$ 91.65	34,500	$ 3,162,065	$ 72,153,679
November 1-30, 2018	31,500	96.50	31,500	3,039,631	419,114,048
December 1-31, 2018	284,000	81.46	284,000	23,133,354	395,980,693
Total Q4 2018	350,000	$ 83.81	350,000	$ 29,335,050	$ 395,980,693

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(1) On February 20, 2017, our Board of Directors authorized the repurchase of up to $100 million of our common stock. On November 1, 2018, our Board of Directors approved the authorization for the repurchase of up to an additional $350 million of Ingevity’s outstanding common stock. The approval of this $350 million is in addition to the $100 million share repurchase program approved in February 2017. The repurchase program does not include a specific timetable or price targets and may be suspended or terminated at any time. Shares may be purchased through open market or privately negotiated transactions at the discretion of management based on its evaluation of market prevailing conditions and other factors.

Stock Performance Graph

The following table and graph present the cumulative total stockholder return for Ingevity's common stock compared with the Standard & Poor's (S&P) SmallCap 600 Index and the Dow Jones (DJ) U.S. Specialty Chemicals Index since the Separation.

The graph assumes the investment of $100 in each of Ingevity's common stock, the S&P SmallCap 600 Index, and DJ U.S. Specialty Chemicals Index on May 16, 2016, the date that Ingevity's common stock began "regular-way" trading on NYSE, and that all dividends, if any, were reinvested.

		December 31,		
	May 16, 2016	2016	2017	2018
Ingevity Corporation	$ 100.00	$ 204.24	$ 262.36	$ 311.58

S&P SmallCap 600 Index	100.00	123.53	139.77	127.87
Dow Jones US Specialty Chemicals Index	$100.00	$105.60	$129.24	$120.40

The graph and related information set forth above are not deemed to be "filed" with the SEC for purposes of Section 18 of the Exchange Act or incorporated by reference into any future filing made by us with the SEC, except to the extent that we specifically incorporate it by reference into any such filing. The stock price performance included in the graph above is not necessarily indicative of future stock performance.

ITEM 6. SELECTED FINANCIAL DATA

Ingevity did not operate as a separate, stand-alone entity for all five years listed below. Our consolidated balance sheets as of December 31, 2018, 2017, and 2016, respectively, and our consolidated statement of operations, comprehensive income (loss), and cash flows for the years ended December 31, 2018 and 2017, respectively, consist of the consolidated balances of Ingevity as prepared on a stand-alone basis. Our consolidated balance sheets as of December 31, 2015 and 2014, respectively, our consolidated statements of operations, comprehensive income (loss), and cash flows for the years ended December 31, 2016, 2015 and 2014, respectively, have been prepared on a "carve out" basis for the periods and dates prior to the spin-off on May 15, 2016. The selected consolidated financial data should be read in conjunction with our Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K.

	Years Ended December 31,				
In millions, except per share and share data	2018	2017	2016	2015	2014
Statement of Operations Data:					
Net sales	$1,133.6	$972.4	$908.3	$958.3	$1,035.5
Gross profit	416.8	329.0	274.4	275.4	318.5
Income before income taxes	221.8	174.8	87.0	136.5	202.1
Net income (loss) attributable to Ingevity stockholders	169.1	126.5	35.2	79.7	129.0
Per Share Data attributable to Ingevity stockholders [1]					
Basic earnings (loss) per share	$4.02	$3.00	$0.83	$1.89	$3.06
Diluted earnings (loss) per share	$3.97	$2.97	$0.83	$1.89	$3.06
Balance Sheet Data (at period end):					
Working capital [2]	$239.4	$215.5	$158.3	$196.5	$128.7
Property, plant and equipment, net	523.8	438.5	422.8	437.5	410.1
Total assets	1,315.2	929.6	832.8	778.7	715.1
Long-term debt including capital lease obligations	741.2	444.0	481.3	80.0	85.8
Total equity	338.7	277.9	134.6	517.4	416.6
Other Data:					
Capital expenditures	$93.9	$52.6	$56.7	$100.9	$101.8
Depreciation and amortization expense	57.0	40.4	38.8	34.6	32.3
Weighted average common stock outstanding (in thousands) [1]:					
Basic shares	42,037	42,130	42,108	42,102	42,102
Diluted shares	42,601	42,529	42,271	42,102	42,102

(1) On May 15, 2016, WestRock distributed 42.1 million shares of Ingevity's common stock to holders of its common stock. Basic and diluted earnings (loss) per share for the years ended December 31, 2015 and 2014 are calculated using the number of common shares distributed on May 15, 2016. Basic and diluted earnings (loss) per share for the year ended December 31, 2016 is calculated using the weighted average number of common shares outstanding for the period beginning after the distribution date.

(2) Defined as current assets less current liabilities.

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

Introduction

Management's discussion and analysis of Ingevity's financial condition and results of operations ("MD&A") is provided as a supplement to the Consolidated Financial Statements and related notes included elsewhere herein to help provide an understanding of our financial condition, changes in financial condition and results of our operations.

Cautionary Statements About Forward-Looking Statements

This section and other parts of this Annual Report on Form 10-K contain forward-looking statements, within the meaning of the Securities Exchange Act of 1934, as amended (the "Exchange Act") and the Private Securities Litigation Reform Act of 1995 that reflect our current expectations, beliefs, plans or forecasts with respect to, among other things, future events and financial performance. Forward-looking statements are often characterized by words or phrases such as "may," "will," "could," "should," "would," "anticipate," "estimate," "expect," "project," "intend," "plan," "bel "prospects," "potential" and "forecast," and other words, terms and phrases of similar meaning. Forward-looking statements involve estimates, expectations, projections, goals, forecasts, assumptions, risks and uncertainties. We caution readers that a forward-looking statement is not a guarantee of future performance and that actual results could differ materially from those contained in the forward-looking statement. Such risks and uncertainties include, among others, those discussed in Item 1A under the heading "Risk Factors" as well as in our consolidated financial statements, related notes, and the other information appearing elsewhere in this report and our other filings with the SEC. We do not intend, and undertake no obligation, to update any of our forward-looking statements after the date of this report to reflect actual results or future events or circumstances. Given these risks and uncertainties, readers are cautioned not to place undue reliance on such forward-looking statements. In addition to any such risks, uncertainties and other factors discussed elsewhere herein, risks, uncertainties and other factors that could cause or contribute to actual results differing materially from those expressed or implied by the forward-looking statements include, but are not limited to the following:

- we are exposed to risks that the expected benefits from the Pine Chemicals Acquisition and the Caprolactone Acquisition may not be realized or will not be realized within the expected time period, the risk of significant transaction costs and unknown or understated liabilities;
- we may be adversely affected by general economic and financial conditions beyond our control;
- we are exposed to risks related to our international sales and operations;
- our reported results could be adversely affected by currency exchange rates and currency devaluation could impair our competitiveness;
- our operations outside the U.S. require us to comply with a number of U.S. and foreign regulations, violations of which could have a material adverse effect on our financial condition and results of operations;
- our engineered polymers product line may be adversely affected by Brexit;
- we are dependent upon attracting and retaining key personnel;
- adverse conditions in the global automotive market or adoption of alternative or new technologies may adversely affect demand for our automotive carbon products;
- we face competition from producers of alternative products and new technologies, and new or emerging competitors;
- we face competition from infringing intellectual property activity;
- if increasingly more stringent air quality standards worldwide are not adopted, our growth could be impacted;
- we may be adversely affected by a decrease in government infrastructure spending;
- our printing inks business serves customers in a market that is facing declining volumes and downward pricing;
- our Performance Chemicals segment is highly dependent on crude tall oil ("CTO") which is limited in supply;
- lack of access to sufficient CTO would impact our ability to produce CTO-based products;
- a prolonged period of low energy prices may materially impact our results of operations;

- we are dependent upon third parties for the provision of certain critical operating services at several of our facilities;
- the occurrence of a natural disaster, such as a hurricane, winter or tropical storm, earthquake, tornado, flood, fire or other matters such as labor difficulties (including work stoppages), equipment failure or unscheduled maintenance and repair, which could result in operational disruptions of varied duration;
- from time to time we are called upon to protect our intellectual property rights and proprietary information though litigation and other means;
- if we are unable to protect our intellectual property and other proprietary information we may lose significant competitive advantage;
- information technology security breaches and other disruptions;
- government policies and regulations, including, but not limited to, those affecting the environment, climate change, tax policies and the chemicals industry; and
- losses due to lawsuits arising out of environmental damage or personal injuries associated with chemical or other manufacturing processes.

Overview

Ingevity is a leading global manufacturer of specialty chemicals and high performance activated carbon materials. We provide innovative solutions to meet our customers' unique and demanding requirements through proprietary formulated products. We report in two business segments, Performance Materials and Performance Chemicals.

Our Performance Materials segment consists of our automotive technologies and process purifications product lines. Performance Materials manufactures products in the form of powder, granular, extruded pellets, extruded honeycombs, and activated carbon sheets. Automotive technologies products are sold into gasoline vapor emission control applications within the automotive industry, while process purification products are sold into the food, water, beverage, and chemical purification industries.

Our Performance Chemicals segment consists of our pavement technologies, oilfield technologies, industrial specialties, and engineered polymers product lines. Performance Chemicals manufactures products derived from CTO and lignin extracted from the kraft paper making process as well as caprolactone monomers and derivatives derived from cyclohexanone and hydrogen peroxide. Performance Chemicals products serve as critical inputs used in a variety of high performance applications, including pavement preservation, pavement adhesion promotion, and warm mix paving (pavement technologies product line), oil well service additives, oil production, and downstream application chemicals (oilfield technologies product line), printing inks, adhesives, agrochemicals, lubricants, and industrial intermediates (industrial specialties product line), coatings, resins, elastomers, adhesives, and bio-plastics (engineered polymers product line).

Recent Developments

Perstorp AB's Caprolactone Business

On December 10, 2018, we entered into an agreement for the Sale and Purchase of Perstorp UK Ltd. (the "Caprolactone Agreement") with Perstorp Holding AB, a company registered in Sweden, that develops, manufactures, and sells specialty chemicals (the "Seller"). Pursuant to the Caprolactone Agreement, we agreed to purchase the shares held by the Seller in Perstorp UK Ltd., including the Seller's entire caprolactone business, in exchange for €570.9 million, less assumed debt and other miscellaneous transaction costs, as further defined in the Caprolactone Agreement (the "Purchase Price"), plus interest accrued on the Purchase Price (herein referred to as the "Caprolactone Acquisition").

On February 13, 2019, pursuant to the terms and conditions set forth in the Caprolactone Agreement, we completed the Caprolactone Acquisition for an aggregate preliminary purchase price of €578.9 million ($652.5 million) excluding net debt to be assumed of €100.4 million ($113.1 million). At closing, the assumed net debt was settled with an affiliate of the counterparty, Perstorp Holding AB. Beginning in the first quarter of 2019, the Caprolactone Acquisition will be integrated into our Performance Chemicals segment and included within our Engineered Polymers product line. Our revolving credit facility was utilized as the

37

primary source of funds, along with available cash on hand, to close our Caprolactone Acquisition. Our available capacity under our revolving credit facility immediately following this drawdown was $113.1 million.

Caprolactone Acquisition is considered a business under business combinations accounting guidance, and therefore we will apply acquisition accounting. Acquisition accounting requires, among other things, that assets and liabilities assumed be recognized at their fair values as of the acquisition date. The net assets of the Caprolactone Acquisition will be recorded at the estimated fair values using primarily Level 2 and Level 3 inputs (see Note 6 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for an explanation of Level 2 and 3 inputs).

We have performed a preliminary valuation of the fair value of the acquired assets and liabilities assumed. Based on this preliminary allocation of the purchase price, we believe the primary assets acquired and their estimated values are; goodwill of approximately $310 million and tangible and intangible assets of approximately $220 million. This preliminary assessment of fair value is based on draft reports from our valuation experts and is subject to change based on its preliminary nature. Once our detailed preliminary purchase price valuation is completed, we will include the required additional details in our future filings. We have not completed the detailed analysis to present the pro forma financial information for the combined companies. Thus, the pro forma financial information will be included in our future filings as well.

Revolving Credit and Term Loan Facility Amendment

On August 7, 2018, we entered into an Incremental Facility Agreement and Amendment No. 2 (the “Amendment”) to the Credit Agreement, dated as of March 7, 2016 (the “Existing Credit Agreement”, and as amended, supplemented or otherwise modified from time to time, including pursuant to the Incremental Facility Agreement and Amendment No. 1, dated as of August 21, 2017, and the Amendment, the “Amended Credit Agreement”). Among other things, the Amendment (i) increased the revolving commitments under the Existing Credit Agreement by $200.0 million (the “Incremental Revolving Commitments”) to $750 million and (ii) reduced the Applicable Rate (as defined in the Amended Credit Agreement). The Amendment also extended the maturity date for the loans and commitments under the Existing Credit Agreement to August 7, 2023.

The Incremental Revolving Commitments have terms identical to those of the Revolving Commitments under the Existing Credit Agreement and will be treated as a single class with such existing commitments under the Amended Credit Agreement.

Loans under the Amended Credit Agreement bear interest at either (a) an adjusted base rate or (b) an adjusted LIBOR rate, in each case, plus an applicable margin (the “Applicable Margin”), in the case of base rate loans, ranging between zero percent and 0.75 percent, and in the case of adjusted LIBOR rate loans, ranging between 1.00 percent and 1.75 percent. The Applicable Margin is based on a total leverage based pricing grid. Fees to revolving lenders under the Amended Credit Agreement, including fees in respect of the Incremental Revolving Commitments, include (i) commitment fees, based on a percentage of the daily unused portions of the facility, ranging from 0.15 percent to 0.30 percent and (ii) customary letter of credit fees.

As consideration for the Amendment, the Company paid to each lender under the Existing Credit Agreement a consent fee equal to 0.05 percent of the aggregate principal amount of the commitments and outstanding loans held by such lender immediately prior to the Closing Date. Fees of $1.4 million were incurred to secure the Amended Credit Agreement. These fees have been deferred and will be amortized over the term of the arrangement.

The credit facilities under the Amended Credit Agreement will mature on August 7, 2023. The Initial Term Loans and the Incremental Term A Loans (each, as defined in the Amended Credit Agreement) will amortize at a rate equal to 1.25 percent per quarter starting in September 2019, with the balance due at maturity.

Acquisition of Noncontrolling Interest

On August 1, 2018, we acquired the remaining 30 percent ownership interest in our joint venture Purification Cellutions, LLC, now known as Ingevity Georgia, LLC, for an aggregate purchase price of $80.0 million. Ingevity Georgia, LLC manufactures our extruded honeycomb products within our Performance Materials segment.

2018 Senior Notes

On January 24, 2018, we issued $300.0 million aggregate principal amount of 4.50 percent senior unsecured notes due 2026 (the “Notes”). The Notes were issued pursuant to an indenture dated as of January 24, 2018 (the “Indenture”), by and among Ingevity, the subsidiary guarantors party thereto and U.S. Bank National Association, as trustee. The Notes were offered and sold only to persons reasonably believed to be qualified institutional buyers pursuant to Rule 144A and to certain non-U.S. persons

outside the U.S. pursuant to Regulation S under the Securities Act of 1933, as amended (the “Securities Act”). The Notes have not been registered under the Securities Act or any state securities laws and may not be offered or sold in the U.S. absent registration or an applicable exemption from the registration requirements of the Securities Act and applicable state laws.

The net proceeds from the sale of the Notes, after deducting deferred financing fees of $5.7 million, were $294.3 million. We used the net proceeds from the sale of the Notes to finance, in part, our purchase of substantially all the assets primarily used in the pine chemicals business of Georgia-Pacific Chemicals LLC and Georgia-Pacific LLC.

Interest payments on the Notes are due semiannually in arrears on February 1st and August 1st of each year, beginning on August 1, 2018, at a rate of 4.50 percent per year. The Notes will mature on February 1, 2026.

The Indenture contains certain customary covenants (including covenants limiting Ingevity and our restricted subsidiaries’ ability to grant or permit liens on certain property securing debt, declare or pay dividends, make distributions on or repurchase or redeem capital stock, make investments in unrestricted subsidiaries, engage in sale and lease-back transactions, and engage in a consolidation or merger, or sell, transfer or otherwise dispose of all or substantially all of the assets of our and our restricted subsidiaries, taken as a whole) and events of default (subject in certain cases to customary exceptions, as well as grace and cure periods). The occurrence of an event of default under the Indenture could result in the acceleration of the Notes and could cause a cross-default that could result in the acceleration of other indebtedness of Ingevity and our subsidiaries.

Georgia-Pacific's Pine Chemical Business Acquisition

On August 22, 2017, we entered into an Asset Purchase Agreement (the "Pine Chemicals Purchase Agreement") with Georgia-Pacific Chemicals LLC, Georgia-Pacific LLC (together with Georgia-Pacific Chemicals LLC, "GP") and Ingevity Arkansas, LLC, a wholly-owned subsidiary of Ingevity, to purchase substantially all the assets primarily used in GP's pine chemical business (the "Pine Chemical Business"), including assets and facilities related to tall oil fractionation operations and the production or modification of tall oil fatty acids, tall oil rosins, rosin derivatives and formulated products (the "Pine Chemicals Acquisition").

On March 8, 2018 (the "Pine Chemicals Acquisition Date"), pursuant to the terms and conditions set forth in the Pine Chemicals Purchase Agreement, we completed the Pine Chemicals Acquisition. During the three months ended September 30, 2018, we finalized the purchase price which included a final adjustment for working capital resulting in an aggregate purchase price of $315.5 million. The Pine Chemicals Acquisition was primarily funded with the net proceeds from the Notes. In addition, on the Pine Chemicals Acquisition Date, the Company and GP entered into a 20-year, market-based CTO supply contract with certain of Georgia-Pacific’s paper mill operations.

We believe the Pine Chemicals Acquisition will provide a stronger platform from which we will accelerate the profitable growth of our Performance Chemicals segment. With the addition of broader technologies and product platforms, we will add scale and competitiveness to this segment, and create value for our shareholders.

Separation and Distribution

On May 15, 2016 (the "Distribution Date"), Ingevity separated from WestRock Company (“WestRock”) (herein referred to as the "Separation"). The Separation was completed pursuant to a Separation and Distribution Agreement and other agreements with WestRock related to the Separation, including an Employee Matters Agreement ("EMA"), a Tax Matters Agreement ("TMA"), a Transition Services Agreement and an Intellectual Property Agreement (collectively, the "Separation Agreements"). The Separation was completed by way of a distribution of all of the then outstanding shares of common stock of Ingevity through a dividend in kind of Ingevity's common stock (par value $0.01) to holders of record of WestRock common stock (par value $0.01) as of the close of business of May 4, 2016 (the "Record Date"). Ingevity's common stock began "regular-way" trading on the New York Stock Exchange ("NYSE") on May 16, 2016 under the symbol "NGVT".

Results of Operations

	Years Ended December 31,		
In millions, except per share data	2018	2017	2016
Net sales	$1,133.6	$972.4	$908.3
Cost of sales	716.8	643.4	633.9
Gross profit	416.8	329.0	274.4
Selling, general and administrative expenses	132.4	106.4	96.4
Research and technical expenses	21.5	19.8	17.6
Separation costs	—	0.9	17.5
Restructuring and other (income) charges, net	(0.5)	3.7	41.2
Acquisition and other related costs	10.8	7.1	—
Other (income) expense, net	1.0	0.5	(3.2)
Interest expense	33.2	18.1	19.3
Interest income	(3.4)	(2.3)	(1.4)
Income (loss) before income taxes	221.8	174.8	87.0
Provision (benefit) for income taxes	40.0	29.6	42.6
Net income (loss)	181.8	145.2	44.4
Less: Net income (loss) attributable to noncontrolling interests	12.7	18.7	9.2
Net income (loss) attributable to Ingevity stockholders	$169.1	$126.5	$35.2

Net Sales Comparison of Years Ended December 31, 2018, 2017 and 2016

		Percentage change vs. prior year			
In millions, except percentages	Net sales	Total change	Currency effect	Price/Mix	Volume
Year Ended December 31, 2018	$1,133.6	17%	1%	1%	15%
Year Ended December 31, 2017	972.4	7%	—%	(1)%	8%

Year Ended December 31, 2018 vs. 2017

Net sales were $1,133.6 million and $972.4 million for the years ended December 31, 2018 and 2017, respectively. The sales increase in 2018 was driven by a volume increase of $142.9 million (15 percent). Performance Materials and Performance Chemicals contributed $44.6 million and $98.3 million, respectively, to the volume impacts during the year. Additionally, the favorable pricing and product mix of $13.5 million (one percent) across both segments, as well as favorable foreign exchange impacts of $4.8 million (one percent) resulted in the year over year Net sales increase.

Year Ended December 31, 2017 vs. 2016

Net sales were $972.4 million and $908.3 million for the years ended December 31, 2017 and 2016, respectively. The sales increase in 2017 was driven by favorable volume of $72.7 million (eight percent of sales). Performance Materials and Performance Chemicals contributed $54.5 million and $18.2 million, respectively, to the volume impacts during the year. The sales increase was tempered by unfavorable pricing and product mix of $7.6 million (one percent of sales) across both segments, as well as unfavorable foreign exchange impacts of $1.0 million.

Cost of sales

Year Ended December 31, 2018 vs. 2017

Cost of sales were $716.8 million (63 percent of sales) and $643.4 million (66 percent of sales) for the years ended December 31, 2018 and 2017, respectively. Increased cost of sales was driven by the sales volume increase resulting in a $75.7 million increase to cost of sales and depreciation and amortization of $5.7 million. These increases were partially offset by lower input costs related to petroleum-based raw materials, energy, and CTO and manufacturing related spending impacting cost of sales by $5.2 million, and reduced cost of sales in foreign locations stemming from the strength of the U.S. dollar of $2.8 million.

Year Ended December 31, 2017 vs. 2016

Cost of sales were $643.4 million (66 percent of sales) and $633.9 million (70 percent of sales) for the years ended December 31, 2017 and 2016, respectively. Increased cost of sales was driven by the sales volume increase resulting in a $31.2 million increase to cost of sales and depreciation and amortization of $0.5 million. These increases were partially offset by lower input costs related to petroleum-based raw materials, energy, and CTO impacting cost of sales by $14.1 million, manufacturing-related spending of $8.0 million due to favorable productivity costs and reduced cost of sales in foreign locations stemming from the strength of the U.S. dollar of $0.1 million.

Selling, general and administrative expenses

Year Ended December 31, 2018 vs. 2017

Selling, general and administrative ("SG&A") expenses were $132.4 million (12 percent of sales) and $106.4 million (11 percent of sales) for the years ended December 31, 2018 and 2017, respectively. The increase in SG&A is primarily due to amortization associated with the Pine Chemicals Acquisition, increase legal costs, partially due to litigation expenses in our Performance Materials segment, and growth related spending in both segments. SG&A expenses as a percentage of sales were relatively flat year over year.

Year Ended December 31, 2017 vs. 2016

SG&A expenses were $106.4 million (11 percent of sales) and $96.4 million (11 percent of sales) for the years ended December 31, 2017 and 2016, respectively. The increase in SG&A is primarily due to higher incentive compensation costs driven by the improvements in gross profit as compared to the prior period. Increased gross profit translates into higher Adjusted EBITDA which is our primary metric for incentive-based compensation. Adjusted EBITDA is defined under the section entitled "Use of Non-GAAP Financial Measures" within this MD&A.

Separation costs

Year Ended December 31, 2018, 2017, and 2016

Separation costs of zero and $0.9 million for the years ended December 31, 2018 and 2017, respectively, were expenses related to the Separation. Separation costs of $0.9 million and $17.5 million for the years ended December 31, 2017 and 2016, respectively, were expenses related to the Separation. See Note 15 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information.

Restructuring and other (income) charges, net

2018 activities

In February 2018, we sold assets from the Performance Chemicals derivatives operations in Duque De Caxias, Rio de Janeiro, Brazil. These assets were part of a facility that was closed as a result of a restructuring event in 2016 (see 2016 activities below). As a result of this sale, we recorded $0.6 million as a gain on sale of assets offset by other employee related costs of $0.1 million for the year ended December 31, 2018.

2017 activities

In January 2017, we initiated a reorganization to streamline our leadership team, flatten the organization and reduce costs. Because of this reorganization, we recorded $1.3 million in severance and other employee-related costs for the year ended December 31, 2017.

During the year ended December 31, 2017, we also recorded $2.4 million of additional miscellaneous exit costs primarily associated with the exit of our Performance Chemicals' manufacturing operations in Palmeira, Santa Catarina, Brazil which began in the fourth quarter of 2016 (see 2016 activities below).

2016 activities

As a result of continued deteriorating market conditions within the South America region, on October 31, 2016, our Board of Directors approved a plan to exit our Performance Chemicals' manufacturing operations in Palmeira, Santa Catarina, Brazil. As a result, we recorded a non-cash pre-tax impairment charge to property, plant and equipment in the amount of $30.2 million and recorded severance costs of $1.8 million. The severance costs began to be paid in the fourth quarter of 2016. Refinery production ceased before year end, and the facility was decommissioned in 2017. We recorded $2.6 million of additional miscellaneous exit costs during the year ended December 31, 2016.

During the first quarter of 2016, we announced the closure of the Performance Chemicals' derivatives operation in Duque de Caxias, Rio de Janeiro, Brazil. As a result of this closure, we recorded $0.1 million impairment charge on fixed assets, $1.8 million in severance and other employee-related costs and $1.7 million of additional miscellaneous exit costs during year ended December 31, 2016.

During the first quarter of 2016, we also announced a company-wide restructuring to better align our workforce in light of changing macroeconomic and market realities. The restructuring decision resulted in workforce reductions at several of our locations. As a result, during the year ended December 31, 2016, we recorded severance and other employee-related charges of $2.7 million ($1.9 million related to Performance Chemicals segment and $0.8 million related to Performance Materials segment). We also recorded an impairment charge on fixed assets of $0.3 million in the year ended December 31, 2016 (related to the Performance Chemicals segment).

Detail on the restructuring charges and asset disposal activities is provided below.

	Years Ended December 31,		
In millions	2018	2017	2016
Restructuring and other (income) charges, net			
Gain on sale of assets and businesses	$(0.6)	$—	$—
Severance and other employee-related costs [1]	0.1	1.3	6.3
Asset write-downs [2]	—	—	30.6
Other (income) charges, net [3]	—	2.4	4.3
Total restructuring and other (income) charges, net	$(0.5)	$3.7	$41.2

(1) Represents severance and employee benefit charges.

(2) Primarily represents accelerated depreciation and impairment charges on long-lived assets, which were or are to be abandoned. To the extent incurred the acceleration effect of re-estimating settlement dates and revised cost estimates associated with asset retirement obligations due to facility shutdowns are also included within the asset write-downs.

(3) Primarily represents costs associated with rental payments, contract terminations, and other miscellaneous exit costs. Other Income primarily represents favorable developments on previously recorded exit costs as recoveries associated with restructuring activities.

Acquisition and other related costs

Years Ended December 31, 2018, 2017, and 2016

Acquisition costs of $10.8 million, $7.1 million, and zero for the years ended December 31, 2018, 2017, and 2016, respectively, were charges incurred in connection with the acquisitions of the Caprolactone Business and Pine Chemical Business. See Note 17 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information.

Interest expense

Interest expense was as follows for the years ended December 31, 2018, 2017, and 2016.

	Years Ended December 31,		
In millions	2018	2017	2016
Interest expense			
Allocated interest expense from WestRock	$—	$—	$7.2
Interest expense on capital lease obligations	6.2	6.1	6.2
Interest expense on revolving credit and term loan facility	14.9	11.4	5.9
Interest expense on senior notes	13.0	—	—
Capitalized interest	(1.1)	(0.3)	(1.7)
Other	0.2	0.9	1.7
Total interest expense, net	$33.2	$18.1	$19.3

Interest income

Years Ended December 31 2017, 2016 and 2015

Interest income was $3.4 million, $2.3 million, and $1.4 million for the years ended December 31, 2018, 2017 and 2016, respectively. Interest income is primarily related to the interest earned on our restricted investment.

Provision (benefit) for income taxes

Additional detail explaining the change in the effective tax rate is presented in Note 18 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K.

Year Ended December 31, 2018 vs. 2017

Our effective tax rate was 18.0 percent and 16.9 percent for the years ended December 31, 2018 and 2017, respectively. The increase in our effective tax rate from 2017 to 2018 is mainly due to the one time benefit of reducing our net deferred tax liability to the 21.0 percent rate in 2017 and effects of certain provisions under U.S. Tax Reform. Our U.S. net deferred tax liabilities as of December 31, 2017 were remeasured from 35.0 percent to 21.0 percent, resulting in $24.5 million of provisional deferred income tax benefit and a reduction in our effective tax rate of 14.0 percent in 2017. During the year ended December 31, 2018, we further adjusted our net deferred tax liabilities by $1.9 million due to further interpretations of U.S. Tax Reform. The remaining difference in our effective tax rate for the years ended December 31, 2018 and 2017, respectively, is due to the change in certain favorable tax deductions under U.S. Tax Reform, such as the elimination of the domestic manufacturing deduction and the addition of the foreign-derived intangible income deduction. In addition to the impact of U.S. Tax Reform, the change in the effective tax rate period over period was also driven by the acquisition of our noncontrolling interest.

Year Ended December 31, 2017 vs. 2016

The Company’s effective tax rate was 16.9 percent and 49.0 percent for the years ended December 31, 2017 and 2016, respectively. The decrease in our effective tax rate from 2016 to 2017 is mainly due to the impact of U.S. Tax Reform. Our U.S. net deferred tax liabilities as of December 31, 2017 were remeasured from 35.0 percent to 21.0 percent, resulting in $24.5 million of provisional deferred income tax benefit and a reduction in our effective tax rate of 14.0 percent. The remaining difference in our effective tax rate for the years ended December 31, 2017 and 2016, respectively, is due to non-deductible transaction costs associated with the Separation in 2016, acquisition-related charges, restructuring and other (income charges) and the unfavorable results of legal entities with full valuation allowances. Excluding the impact of U.S. Tax Reform, acquisition-related charges, restructuring and other (income charges), separation costs and losses from legal entities with full valuation allowances the change in the effective tax rate period over period was primarily due to a shift in earnings mix as it relates to domestic versus foreign income earned. See Note 18 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information.

Net income (loss) attributable to noncontrolling interests

Year Ended December 31, 2018, 2017, and 2016

Net income (loss) attributable to noncontrolling interests was $12.7 million, $18.7 million and $9.2 million for the years ended December 31, 2018, 2017, and 2016, respectively. Our noncontrolling interest represents the 30 percent ownership interest held by a third-party U.S.-based company in our consolidated Purification Cellutions, LLC legal entity, prior to our purchase of this remaining interest on August 1, 2018.

On August 1, 2018, we completed the acquisition of the remaining 30 percent noncontrolling interest in Purification Cellutions, LLC, which was treated as a partnership for tax purposes, for a purchase price of $80.0 million. The acquisition resulted in the elimination of Noncontrolling interest of $11.4 million and the recognition of a Deferred tax asset of $14.3 million, with the remainder being recorded against Additional paid in capital of $54.3 million in our Consolidated Financial Statements.

Purification Cellutions, LLC, now known as Ingevity Georgia, LLC, is the legal entity that manufactures our extruded honeycomb products within our Performance Materials segment. Refer to the Performance Materials' operating profit discussion below within the Segment Operating Results section for further discussion of the segment's performance for the years ended December 31, 2018, 2017, and 2016.

Net income (loss) attributable to Ingevity stockholders

Year Ended December 31, 2018 vs. 2017

Net income (loss) attributable to Ingevity stockholders was $169.1 million and $126.5 million for the years ended December 31, 2018 and 2017, respectively. Net income attributable to Ingevity stockholders in 2018 compared to 2017 was unfavorably impacted by the U.S. Tax Reform benefit recorded in 2017, resulting in a year over year impact of $22.6 million. Excluding this impact, Net income (loss) attributable to Ingevity stockholders in 2018 increased by $65.2 million. This increase was primarily driven by strong segment operating profits from both segments of $36.0 million in Performance Chemicals and $25.2 million in Performance Materials. Also contributing to the increase year over year was a reduction in non-controlling interest of $6.0 million and restructuring and other charges of $4.2 million. These favorable results were slightly offset by an increase in acquisition and other related costs of $5.1 million.

Year Ended December 31, 2017 vs. 2016

Net income (loss) attributable to Ingevity stockholders was $126.5 million and $35.2 million for the years ended December 31, 2017 and 2016, respectively. The year over year impact was primarily driven by a reduction in separation and restructuring and other charges of $54.1 million, slightly offset by acquisition-related charges of $7.1 million. The favorable impact of U.S. Tax Reform for 2017, compared to 2016, was a tax benefit of $24.5 million. Excluding these changes, Net income (loss) attributable to Ingevity stockholders increased by $22.1 million. This increase was primarily driven by strong segment operating profits from both segments, including an increase of $23.6 million in Performance Chemicals and $15.1 million in Performance Materials, offset by an increase in non-controlling interest of $9.5 million.

Segment Operating Results

In addition to the information discussed above, the following sections discuss the results of operations for each of our segments. Our segments are (i) Performance Materials and (ii) Performance Chemicals. In general, the accounting policies of the segments are the same as those described in the Summary of Significant Accounting Policies in Note 3 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K.

Performance Materials

In millions	Years Ended December 31,		
	2018	2017	2016
Net sales			
Automotive Technologies product line	362.0	312.5	263.5
Process Purification product line	38.4	36.8	37.5
Total Performance Materials - Net sales	$400.4	$349.3	$301.0
Segment operating profit	147.2	122.0	106.9

Net Sales Comparison of Years Ended December 31, 2018, 2017, and 2016

In millions, except percentages	Net sales	Percentage change vs. prior year			
		Total change	Currency effect	Price/Mix	Volume
Year Ended December 31, 2018	$400.4	15%	— %	2 %	13 %
Year Ended December 31, 2017	$349.3	16%	(1)%	(1)%	18 %

Year Ended December 31, 2018 vs. 2017

Segment net sales for the Performance Materials segment were $400.4 million and $349.3 million for the years ended December 31, 2018 and 2017, respectively. The sales increase in 2018 was driven by $44.6 million (13 percent) in volume improvements in the automotive carbon market due to strong growth in high content vehicle production for sale into the North American automotive market and increased vehicle content due to regulatory adoption. Additionally, we had improved price and product mix of $5.2 million (two percent) and favorable foreign currency exchange impacts of $1.3 million (zero percent).

Segment operating profit for the Performance Materials segment was $147.2 million and $122.0 million for the years ended December 31, 2018 and 2017, respectively. Segment operating profit increased $25.2 million primarily due to $28.6 million in favorable volumes and $8.2 million in favorable pricing and product mix. These gains were partially offset by higher SG&A expenses of $9.2 million, higher production, freight inflation, and operating costs associated with increased production of $1.8 million, and foreign currency exchange impacts of $0.6 million.

Year Ended December 31, 2017 vs. 2016

Segment net sales for the Performance Materials segment were $349.3 million and $301.0 million for the years ended December 31, 2017 and 2016, respectively. The sales increase in 2017 was driven by $54.5 million (18 percent) in volume improvements in the automotive carbon market due to strong growth in high content vehicle production for sale into the North American automotive market and increased vehicle content due to regulatory adoption. These gains were partially offset by $3.8 million (one percent) in pricing and product mix and unfavorable foreign currency exchange impacts of $2.4 million (one percent).

Segment operating profit for the Performance Materials segment was $122.0 million and $106.9 million for the years ended December 31, 2017 and 2016, respectively. Segment operating profit increased $15.1 million primarily due to $27.1 million in favorable volumes and $0.4 million in favorable pricing and product mix. These gains were partially offset by higher SG&A expenses of $8.5 million, higher production and operating costs associated with increased production of $3.2 million, and foreign currency exchange impacts of $0.7 million.

Performance Chemicals

In millions	Years Ended December 31, 2018	2017	2016
Net sales			
Pavement Technologies product line	$178.5	$163.0	$148.8
Oilfield Technologies product line	114.2	77.8	58.5
Industrial Specialties product line	440.5	382.3	400.0
Total Performance Chemicals - Net sales	$733.2	$623.1	$607.3
Segment operating profit	116.3	80.3	56.7

Net Sales Comparison of Years Ended December 31, 2018, 2017, and 2016

In millions, except percentages	Net sales	Percentage change vs. prior year Total change	Currency effect	Price/Mix	Volume
Year Ended December 31, 2018	$733.2	18%	1 %	1 %	16 %
Year Ended December 31, 2017	$623.1	3 %	— %	— %	3 %

Pine Chemical Business Acquisition

The Pine Chemical Business has been integrated into our Performance Chemicals segment and has been included within our results of operations since the Pine Chemicals Acquisition Date. Although not yet complete, a substantial portion of the Pine Chemicals Business has been integrated into our existing Performance Chemicals operations. As a result, our ability to separate net sales and operating performance of the Pine Chemicals Acquisition from our existing Performance Chemicals operating results is no longer practical. The information presented below for the year ended December 31, 2018, includes the results of the Pine Chemicals Acquisition as compared to the historical results of the year ended ended December 31, 2017. For a pro forma comparative analysis of 2018 versus 2017 results, refer to the section below titled "Performance Chemical Pro Forma Financial Results with the Pine Chemical Business."

Year Ended December 31, 2018 vs. 2017

Segment net sales for the Performance Chemicals segment were $733.2 million and $623.1 million for the years ended December 31, 2018 and 2017, respectively. The sales increase was driven by favorable volume of $98.3 million (16 percent) driven by industrial specialties ($52.3 million), oilfield technologies ($33.9 million) and pavement technologies ($12.1 million). Additionally, favorable pricing and product mix of $8.3 million in certain industrial specialties ($3.3 million), oilfield technologies ($2.3 million), and and pavement technologies ($2.7 million) markets and favorable $3.5 million of foreign currency exchange contributed to results.

Segment operating profit for the Performance Chemicals segment was $116.3 million and $80.3 million for the years ended December 31, 2018 and 2017, respectively. Segment operating profit increased $36.0 million due to favorable volume of $38.5 million, favorable price and product mix of $12.4 million, favorable manufacturing and production costs, net of freight inflation, of $1.1 million, and favorable foreign currency exchange of $2.6 million. These gains were partially offset by unfavorable SG&A expenses of $18.6 million, which was partially due to amortization associated with the Pine Chemicals Acquisition.

Year Ended December 31, 2017 vs. 2016

Segment net sales for the Performance Chemicals segment were $623.1 million and $607.3 million for the years ended December 31, 2017 and 2016, respectively. The sales increase was driven by favorable volume of $18.2 million (three percent) driven by oilfield technologies ($24.6 million) and pavement technologies ($9.8 million), partially offset by unfavorable volume in industrial specialties ($16.2 million). The favorable volume was partially offset by unfavorable pricing and product mix of $3.8 million in certain industrial specialties ($2.5 million) and oilfield technologies ($5.5 million) markets, partially offset by favorable pricing and product mix in pavement technologies ($4.2 million). The sales increase was also driven by $1.4 million of favorable foreign currency exchange.

Segment operating profit for the Performance Chemicals segment was $80.3 million and $56.7 million for the years ended December 31, 2017 and 2016, respectively. Segment operating profit increased $23.6 million due to favorable manufacturing productivity of $27.3 million, as well as favorable volume of $7.5 million. These gains were offset by unfavorable foreign currency exchange impacts of $5.3 million, unfavorable SG&A expenses of $3.8 million, and unfavorable pricing and product mix of $2.1 million.

Performance Chemical Pro Forma Financial Results with the Pine Chemical Business

We believe that reviewing our operating results by combining actual and pro forma results for our Performance Chemicals segment is useful in identifying trends in, or reaching conclusions regarding, the overall operating performance. Our pro forma segment information includes adjustments as if the Pine Chemicals Acquisition had occurred on January 1, 2017. Our pro forma results are adjusted for the effects of acquisition accounting but do not include adjustments for costs related to integration activities, cost savings or synergies that might be achieved by the combined businesses. Pro forma amounts to be presented are not necessarily indicative of what our results would have been had we operated the Pine Chemical Business since January 1, 2017, nor will the pro forma amounts necessarily be indicative of our future results.

Performance Chemical Pro Forma Financial Results

	Year Ended December 31,	
In millions	2018	2017
Net sales		
Performance Chemicals, as reported [1]	$733.2	$623.1
Pine Chemical Business, pro forma [2]	20.2	100.6
Pro Forma Combined Net Sales [3]	$753.4	$723.7
Segment Operating Profit		
Performance Chemicals, as reported [1]	$116.3	$80.3
Pine Chemical Business, pro forma [2]	1.7	9.2
Pro Forma Combined Segment Operating Profit [3]	$118.0	$89.5

(1) As reported amounts are the results of operations of Performance Chemicals, including the results of the Pine Chemical Business, post Pine Chemical Acquisition Date.

(2) Pro forma amounts include historical results of the Pine Chemical Business, prior to the Pine Chemical Acquisition Date. These amounts also include adjustments as if the Pine Chemicals Acquisition had occurred on January 1, 2017, including the effects of purchase accounting. The pro forma amounts do not include adjustments for expenses related to integration activities, cost savings, or synergies that have been or may have been realized had we acquired the Pine Chemical Business on January 1, 2017.

(3) The pro forma combined results are not necessarily indicative of what the results would have been had we acquired the Pine Chemical Business on January 1, 2017, nor indicative of future results.

Performance Chemical Pro Forma Combined Net Sales

	Year Ended December 31,	
In millions	2018	2017
Oilfield Technologies product line	$118.8	$101.9
Pavement Technologies product line	178.7	164.2
Industrial Specialties product line	455.9	457.6
Pro Forma Combined Net Sales - Performance Chemicals	$753.4	$723.7

Pro Forma Comparison of Year Ended December 31, 2018 vs. 2017

		Percentage change vs. prior year			
Performance Chemicals (In millions, except percentages)	Pro Forma Combined Net sales	Total change	Currency effect	Price/Mix	Volume
Year Ended December 31, 2018	$753.4	4 %	— %	2 %	2 %

Pro Forma Combined Results - Year Ended December 31, 2018 vs. 2017

Pro Forma Combined Net Sales for the Performance Chemicals segment were $753.4 million and $723.7 million for the year ended December 31, 2018 and 2017, respectively. The Pro Forma Combined Net Sales increase was driven by favorable volume of $10.9 million (two percent), which consisted of favorable volumes in pavement technologies products ($9.3 million), oilfield technologies ($10.9 million), offset by unfavorable volumes in industrial specialties ($9.3 million). Also driving the sales increase was pricing and product mix of $15.3 million (two percent) driven by favorable price and product mix in oilfield technologies ($5.8 million), pavement technologies products ($4.5 million), and industrial specialties ($5.0 million). In addition, $3.5 million of favorable foreign currency exchange (less than one percent) helped drive the sales increase.

Pro Forma Combined Segment Operating Profit for the Performance Chemicals segment was $118.0 million and $89.5 million for the year ended December 31, 2018 and 2017, respectively. Pro Forma Combined Segment Operating Profit increased by $28.5 million primarily due to increased volumes of $6.1 million, $14.9 million of favorable pricing and product mix, $7.3 million of favorable manufacturing productivity primarily driven by lower raw material pricing, specifically CTO, offset partially by freight inflation, and $2.6 million due to favorable foreign currency exchange. These favorable operating results were partially offset by $2.4 million of unfavorable SG&A costs, driven by growth-related spending.

Use of Non-GAAP Financial Measures

Ingevity has presented certain financial measures, defined below, which have not been prepared in accordance with U.S. generally accepted accounting principles (“GAAP”) and has provided a reconciliation to the most directly comparable financial measure calculated in accordance with GAAP. These financial measures are not meant to be considered in isolation or as a substitute for the most directly comparable financial measure calculated in accordance with GAAP. The company believes these non-GAAP measures provide investors, potential investors, securities analysts and others with useful information to evaluate the performance of the business, because such measures, when viewed together with our financial results computed in accordance with GAAP, provide a more complete understanding of the factors and trends affecting our historical financial performance and projected future results.

Ingevity uses the following non-GAAP measures:

Adjusted earnings (loss) is defined as net income (loss) attributable to Ingevity stockholders plus restructuring and other (income) charges, separation costs, acquisition and other related costs, pension and postretirement settlement and curtailment (income) charges and the income tax expense (benefit) on those items, less the benefit from U.S. Tax Reform.

Diluted adjusted earnings (loss) per share is defined as diluted earnings (loss) per common share attributable to Ingevity stockholders plus restructuring and other (income) charges, net per share, separation costs per share, acquisition and other related costs per share, pension and postretirement settlement and curtailment (income) charges per share and the income tax expense (benefit) per share on those items, less the per share tax benefit from U.S. Tax Reform.

Adjusted EBITDA is defined as net income (loss) plus provision for income taxes, interest expense, net, depreciation and amortization, restructuring and other (income) charges, separation costs and acquisition and other related costs, pension and postretirement settlement and curtailment (income) charges.

Adjusted EBITDA Margin is defined as Adjusted EBITDA divided by Net Sales.

Segment EBITDA is defined as segment operating profit plus depreciation and amortization.

Segment EBITDA Margin is defined as Segment EBITDA divided by Net Segment Sales.

We use the above financial measures as the primary measures of profitability used by managers of the business and its segments. In addition, we believe Adjusted EBITDA and Segment EBITDA are useful measures because they exclude the effects of financing and investment activities as well as non-operating activities. These non-GAAP financial measures are not intended to replace the presentation of financial results in accordance with GAAP and investors should consider the limitations associated with these non-GAAP measures, including the potential lack of comparability of these measures from one company to another. Reconciliations of these non-GAAP financial measures are set forth within this section.

Reconciliation of Net Income to Adjusted EBITDA

	Years Ended December 31,		
In millions	2018	2017	2016
Net income (loss) (GAAP)	$ 181.8	$ 145.2	$ 44.4
Provision (benefit) for income taxes	40.0	29.6	42.6
Interest expense	33.2	18.1	19.3
Interest income	(3.4)	(2.3)	(1.4)
Depreciation and amortization	57.0	40.4	38.8
Separation costs	—	0.9	17.5
Restructuring and other (income) charges, net	(0.5)	3.7	41.2
Pension and postretirement settlement and curtailment income (charges)	0.2	—	—
Acquisition and other related costs	12.2	7.1	—
Adjusted EBITDA (Non-GAAP)	$ 320.5	$ 242.7	$ 202.4

Adjusted EBITDA

Year Ended December 31, 2018 vs. 2017

Adjusted EBITDA was $320.5 million and $242.7 million for years ended December 31, 2018 and 2017, respectively. The factors that impacted Adjusted EBITDA period to period are the same factors that affected earnings discussed in the sections entitled "Results of Operations" and "Segment Operating Results" within MD&A.

Year Ended December 31, 2017 vs. 2016

Adjusted EBITDA was $242.7 million and $202.4 million for years ended December 31, 2017 and 2016, respectively. The factors that impacted Adjusted EBITDA period to period are the same factors that affected earnings discussed in the sections entitled "Results of Operations" and "Segment Operating Results" within MD&A.

Reconciliation of Segment Operating Profit to Segment EBITDA

Performance Materials	Years Ended December 31,		
In millions	2018	2017	2016
Segment operating profit (GAAP)	$147.2	$122.0	$106.9
Depreciation and amortization	22.2	19.8	16.4
Segment EBITDA (Non-GAAP)	$169.4	$141.8	$123.3

Performance Chemicals	Years Ended December 31,		
In millions	2018	2017	2016
Segment operating profit (GAAP)	$116.3	$80.3	$56.7
Depreciation and amortization	34.8	20.6	22.4
Segment EBITDA (Non-GAAP)	$151.1	$100.9	$79.1

Performance Materials

Year Ended December 31, 2018 vs. 2017

Segment EBITDA for the Performance Materials segment was $169.4 million and $141.8 million for the years ended December 31, 2018 and 2017, respectively. The factors that impacted Segment EBITDA period to period are the same factors that affected segment operating profit discussed in the section entitled "Segment Operating Results" within the MD&A, excluding the depreciation and amortization expense.

Year Ended December 31, 2017 vs. 2016

Segment EBITDA for the Performance Materials segment was $141.8 million and $123.3 million for the years ended December 31, 2017 and 2016, respectively. The factors that impacted Segment EBITDA period to period are the same factors that affected segment operating profit discussed in the section entitled "Segment Operating Results" within the MD&A, excluding the depreciation and amortization expense.

Performance Chemicals

Year Ended December 31, 2018 vs. 2017

Segment EBITDA for the Performance Chemicals segment was $151.1 million and $100.9 million for the years ended December 31, 2018 and 2017, respectively. The factors that impacted Segment EBITDA period to period are the same factors that affected segment operating profit discussed in the section entitled "Segment Operating Results" within the MD&A, excluding the depreciation and amortization expense.

Year Ended December 31, 2017 vs. 2016

Segment EBITDA for the Performance Chemicals segment was $100.9 million and $79.1 million for the years ended December 31, 2017 and 2016, respectively. The factors that impacted Segment EBITDA period to period are the same factors that affected segment operating profit discussed in the section entitled "Segment Operating Results" within the MD&A, excluding the depreciation and amortization expense.

Total Company Outlook and 2019 Guidance

For revenue, favorable volume in Performance Materials driven by continued regulatory changes and favorable volume in Performance Chemicals pavement technologies driven by continued chemistry adoption and global growth are expected to be partially offset by lower volume in Performance Chemicals industrial specialties applications as we continue to focus on improving price and mix in those product lines. We expect flat volumes in Performance Chemicals oilfield technologies and are assuming that the price of oil remains stable in the mid $50’s per barrel for West Texas Intermediate during 2019. Adding in the Caprolactone

Acquisition as of February 13, 2019, we expect to deliver fiscal year 2019 Net Sales of $1.30 billion to $1.36 billion, up 17 percent at the midpoint versus 2018.

Adjusted EBITDA is expected to grow by 22 percent to 28 percent versus 2018. In the Performance Materials segment, growth will be driven by continued volume, price and mix improvements as the US and Canada continue adoption of the Tier 3/LEV III standard, China demand increases with early adoption of China 6 and European demand increases as they implement Euro 6d. This growth will be partially offset by marginally lower vehicle demand in the US & Europe, higher costs as we cycle through the higher cost inventory produced during the Zhuhai, China, facility ramp-up and increased legal costs to defend the company's intellectual property. In the Performance Chemicals segment, the addition of the Caprolactone Acquisition will be complemented by continued profitable growth in pavement technologies and mix improvements in industrial specialties. We expect these benefits to be partially offset by somewhat lower volumes in industrial specialties, modest inflationary costs in freight, raw materials, and CTO, as well as higher outage costs at the Warrington facility due to planned outages and higher transition service agreement costs as we separate Warrington from Perstorp. Some risks to the 2019 outlook include lower than anticipated U.S., China, Canadian and European vehicle sales and production, higher non-CTO raw materials costs with higher oil prices, a shift towards smaller vehicles in the U.S. (versus the 2016 to 2018 shift towards light-trucks), lower oil prices and a reduction in oil drilling and production in oilfield technologies, Brexit and ongoing trade and tariff discussions between the U.S. and other countries. We expect to deliver fiscal year 2019 Adjusted EBITDA of $390 million to $410 million.

A reconciliation of net income to adjusted EBITDA as projected for 2019 is not provided. Ingevity does not forecast net income as it cannot, without unreasonable effort, estimate or predict with certainty various components of net income. These components, net of tax, include additional separation costs associated with the separation from WestRock; further restructuring and other income (charges), net; additional acquisition and other related costs in connection with the acquisition of Georgia-Pacific's pine chemical business and Perstorp Holding AB's Capa caprolactone business; additional pension and postretirement settlement and curtailment (income) charges; and revisions due to future guidance and assessment of U.S. tax reform. Additionally, discrete tax items could drive variability in our projected effective tax rate. All of these components could significantly impact such financial measures. Further, in the future, other items with similar characteristics to those currently included in adjusted EBITDA, that have a similar impact on comparability of periods, and which are not known at this time, may exist and impact adjusted EBITDA.

Liquidity and Capital Resources

The primary source of liquidity for Ingevity's business is the cash flow provided by operating activities. We expect our cash flow provided by operations combined with cash on hand and available capacity under our revolving credit facility to be sufficient to meet our working capital needs. We believe these sources will be sufficient to fund our planned operations and meet our interest and other contractual obligations for at least the next twelve months. Over the next twelve months, we expect to make interest payments, capital expenditures, principal repayments, treasury share repurchases, income tax payments, close the pending Caprolactone Acquisition, and incur additional acquisition-related costs. As of December 31, 2018, our available capacity under our revolving credit facility was $748.1 million. On February 13, 2019, our revolving credit facility was utilized as the primary source of funds, along with available cash on hand, to close our Caprolactone Acquisition. Our available capacity under our revolving credit facility immediately following this drawdown was $113.1 million.

Cash and cash equivalents totaled $77.5 million at December 31, 2018. Management continuously monitors deposit concentrations and the credit quality of the financial institutions that hold Ingevity's cash and cash equivalents, as well as the credit quality of its insurance providers, customers and key suppliers.

Due to the global nature of our operations, a portion of our cash is held outside the U.S. The cash and cash equivalents balance at December 31, 2018 included $27.0 million held by our foreign subsidiaries. Cash and earnings of our foreign subsidiaries are generally used to finance our foreign operations and capital expenditures. We believe that our foreign holdings of cash will not have a material adverse impact on our U.S. liquidity. Management does not currently expect to repatriate cash earnings from our foreign operations in order to fund U.S. operations. If these earnings were distributed, such amounts would be subject to U.S. federal income tax at the statutory rate less the available foreign tax credits, if any, and potentially subject to withholding taxes in the various jurisdictions. The potential tax implications of the repatriation of unremitted earnings are driven by facts at the time of distribution, therefore, it is not practicable to estimate the income tax liabilities that might be incurred if such cash and earnings were repatriated to the U.S.

Revolving Credit and Term Loan Facility Amendment

On August 7, 2018, we entered into an Incremental Facility Agreement and Amendment No. 2 (the "Amendment") to the Credit Agreement, dated as of March 7, 2016 (the "Existing Credit Agreement", and as amended, supplemented or otherwise modified from time to time, including pursuant to the Incremental Facility Agreement and Amendment No. 1, dated as of August 21, 2017, and the Amendment, the "Amended Credit Agreement"). Among other things, the Amendment (i) increased the revolving commitments under the Existing Credit Agreement by $200.0 million (the "Incremental Revolving Commitments") to $750 million and (ii) reduced the Applicable Rate (as defined in the Amended Credit Agreement). The Amendment also extended the maturity date for the loans and commitments under the Existing Credit Agreement to August 7, 2023.

The Incremental Revolving Commitments have terms identical to those of the Revolving Commitments under the Existing Credit Agreement and will be treated as a single class with such existing commitments under the Amended Credit Agreement.

Loans under the Amended Credit Agreement bear interest at either (a) an adjusted base rate or (b) an adjusted LIBOR rate, in each case, plus an applicable margin (the "Applicable Margin"), in the case of base rate loans, ranging between 0.00 percent and 0.75 percent, and in the case of adjusted LIBOR rate loans, ranging between 1.00 percent and 1.75 percent. The Applicable Margin is based on a total leverage based pricing grid. Fees to revolving lenders under the Amended Credit Agreement, including fees in respect of the Incremental Revolving Commitments, include (i) commitment fees, based on a percentage of the daily unused portions of the facility, ranging from 0.15 percent to 0.30 percent and (ii) customary letter of credit fees.

As consideration for the Amendment, the Company paid to each lender under the Existing Credit Agreement a consent fee equal to 0.05 percent of the aggregate principal amount of the commitments and outstanding loans held by such lender immediately prior to the Closing Date. Fees of $1.4 million were incurred to secure the Amended Credit Agreement. These fees have been deferred and will be amortized over the term of the arrangement.

The credit facilities under the Amended Credit Agreement will mature on August 7, 2023. The Initial Term Loans and the Incremental Term A Loans (each, as defined in the Amended Credit Agreement) will amortize at a rate equal to 1.25 percent per quarter starting in September 2019, with the balance due at maturity.

52

2018 Senior Notes

On January 24, 2018, we issued $300.0 million aggregate principal amount of 4.50 percent senior unsecured notes due 2026 (the "Notes"). The Notes were issued pursuant to an indenture dated as of January 24, 2018 (the "Indenture"), by and among Ingevity, the subsidiary guarantors party thereto and U.S. Bank National Association, as trustee. The Notes were offered and sold only to persons reasonably believed to be qualified institutional buyers pursuant to Rule 144A and to certain non-U.S. persons outside the U.S. pursuant to Regulation S under the Securities Act of 1933, as amended (the "Securities Act"). The Notes have not been registered under the Securities Act or any state securities laws and may not be offered or sold in the U.S. absent registration or an applicable exemption from the registration requirements of the Securities Act and applicable state laws.

The net proceeds from the sale of the Notes, after deducting deferred financing fees of $5.7 million were approximately $294.3 million. We used the net proceeds from the sale of the Notes to finance, in part, our purchase of substantially all the assets primarily used in the pine chemicals business of Georgia-Pacific Chemicals LLC and Georgia-Pacific LLC.

Interest payments on the Notes are due semiannually in arrears on February 1st and August 1st of each year, beginning on August 1, 2018, at a rate of 4.50 percent per year. The Notes will mature on February 1, 2026.

The Indenture contains certain customary covenants (including covenants limiting Ingevity and our restricted subsidiaries' ability to grant or permit liens on certain property securing debt, declare or pay dividends, make distributions on or repurchase or redeem capital stock, make investments in unrestricted subsidiaries, engage in sale and lease-back transactions, and engage in a consolidation or merger, or sell, transfer or otherwise dispose of all or substantially all of the assets of our and our restricted subsidiaries, taken as a whole) and events of default (subject in certain cases to customary exceptions, as well as grace and cure periods). The occurrence of an event of default under the Indenture could result in the acceleration of the Notes and could cause a cross-default that could result in the acceleration of other indebtedness of Ingevity and our subsidiaries.

Other Potential Liquidity Needs

Share Repurchases

On February 20, 2017, the Board of Directors authorized the repurchase of up to $100.0 million of our common stock. The repurchase program does not include a specific timetable or price targets and may be suspended or terminated at any time. In addition, on November 1, 2018, the Board of Directors approved the authorization for the repurchase of up to an additional $350.0 million of Ingevity's outstanding common stock. The approval of this $350.0 million is in addition to the $100.0 million share repurchase program approved in February 2017. Shares may be purchased through open market or privately negotiated transactions at the discretion of management based on its evaluation of market prevailing conditions and other factors.

During the year ended December 31, 2018, we repurchased $47.4 million in common shares, representing 561,000 shares of our common stock at a weighted average cost per share of $84.59. At December 31, 2018, $396.0 million remained unused under our Board-authorized repurchase program. We record shares of common stock repurchased at cost as treasury stock, resulting in a reduction of stockholders' equity in the consolidated balance sheets. When the treasury shares are contributed under our employee benefit plans or issued for option exercises, we use a first-in, first-out ("FIFO") method for determining cost. The difference between the cost of the shares and the market price at the time of contribution to an employee benefit plan is added to or deducted from the related capital in excess of par value of common stock.

Capital Expenditures

Projected 2019 capital expenditures are expected to be $110 million to $120 million. We have no material commitments associated with these projected capital expenditures as of December 31, 2018.

Cash flow comparison of Years Ended December 31, 2018, 2017, and 2016

	Years Ended December 31,		
In millions	2018	2017	2016
Net cash provided by (used in) operating activities	$252.0	$174.3	$127.9
Net cash provided by (used in) investing activities	(414.4)	(58.6)	(126.4)
Net cash provided by (used in) financing activities	153.7	(57.8)	(3.4)

53

Cash flows provided by (used in) operating activities

During the year ended December 31, 2018, cash flow provided by operations increased primarily due to higher earnings, partially offset by working capital increases compared to 2017. Working capital increases in 2018 when compared to 2017 are further explained below.

Current Assets and Liabilities

	December 31,	
In millions	2018	2017
Cash and cash equivalents	$77.5	$87.9
Accounts receivable, net	118.9	100.0
Inventories, net	191.4	160.0
Prepaid and other current assets	34.9	20.8
Total current assets	$422.7	$368.7

Current assets as of December 31, 2018, increased $54.0 million compared to December 31, 2017, primarily due to increases in inventories and accounts receivable. Inventories increased $31.4 million, as did Prepaid and other current assets by $14.1 million to support anticipated customer demand in Q1 2019 versus Q1 2018. Increased Accounts receivable, net of $18.9 million was a result of increased sales volume in 2018 as compared to December 31, 2017. These increases were partially offset by a decrease in Cash and cash equivalents of $10.4 million.

	December 31,	
In millions	2018	2017
Accounts payable	$92.9	$83.1
Accrued expenses	36.7	20.0
Accrued payroll and employee benefits	42.0	39.2
Current portion of long-term debt	11.2	9.4
Income taxes payable	0.5	1.5
Total current liabilities	$183.3	$153.2

Current liabilities as of December 31, 2018, increased by $30.1 million compared to December 31, 2017, driven by increases in all of the categories displayed above, except for Income taxes payable. Increases in accounts payable and accrued expenses are consistent with the increases in inventory and prepaids noted above.

Cash flows provided by (used in) investing activities

The cash used in investing activities for the year ended December 31, 2018 was primarily driven by the $315.5 million purchase of the Pine Chemical Business (see Note 17 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information). The remaining cash used by investing activities was primarily driven by capital expenditures.

For the year ended December 31, 2018, capital spending included both growth and maintenance spending for expansion and specialized equipment at our Covington, Virginia, Waynesboro, Georgia, and Changshu, China facilities, as well as base maintenance spending to support ongoing operations across both segments. In addition, we expended funds for cost improvement related to CTO tanks at our DeRidder, Louisiana facility.

For the years ended December 31, 2017 and 2016, capital spending included base maintenance capital supporting ongoing operations and growth spending, primarily related to the construction of an activated carbon manufacturing facility in China and new Performance Chemicals derivative equipment in North Charleston, South Carolina supporting the adhesives, pavement and oilfield markets. For the year ended December 31, 2016, cash used in investing activities was primarily related to $69.7 million invested in a trust. In accordance with the Separation Agreements, we used a portion of the proceeds from our debt borrowing to be held in a restricted trust. The trust, presented as restricted investment on our consolidated balance sheet, was to secure the principal payment under our $80.0 million capital lease obligation which is payable upon maturity in 2027.

Capital expenditure categories	Years Ended December 31,		
In millions	2018	2017	2016
Maintenance	$41.1	$30.3	$32.3
Safety, health and environment	9.6	8.2	7.4
Growth and cost improvement	43.2	14.1	17.0
Total capital expenditures	$93.9	$52.6	$56.7

Cash flows provided by (used in) financing activities

Cash provided by financing activities for the year ended December 31, 2018 was $153.7 million, and was driven by proceeds from long-term borrowings from the issuance of $300.0 million Senior Notes (refer to Note 10 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information), offset by our purchase of the remaining portion of our joint venture with Purification Cellutions, LLC of $80.0 million (refer to Note 12 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information), $47.4 million to repurchase shares according the publicly announced share repurchase program (also refer to Note 12 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information), and noncontrolling interest distributions of $15.3 million.

Cash used by financing activities for the year ended December 31, 2017 was $57.8 million, and was driven by net repayments of $111.9 million (refer to Note 10 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information on our Revolving Credit and Term Loan Facility Amendment), noncontrolling interest distributions of $12.3 million, and $6.6 million to repurchase shares according to the publicly announced share repurchase program.

Cash used by financing activities in the year ended December 31, 2016 was $3.4 million, and was driven by net borrowings of $402.5 million (refer to Note 9 in the Consolidated Financial Statements for more information) and an inflow from transactions with WestRock of $51.9 million offset by a distribution to WestRock at Separation of $448.5 million.

As WestRock managed the Company’s cash and financing arrangements before the Separation, all excess cash generated through earnings was remitted to WestRock and all sources of cash were funded by WestRock prior to May 15, 2016.

Off-Balance Sheet Arrangements

Ingevity is not a party to any off-balance sheet arrangements that have, or are reasonably likely to have, a current or future material effect on Ingevity's financial condition, results of operations or cash flows.

Contractual Obligations

We enter into various contractual obligations throughout the year. Presented below are the contractual obligations of Ingevity as of December 31, 2018, and the time period in which payments under the obligations are due. Included below are disclosures regarding the amounts due under purchase obligations. A purchase obligation is defined as an agreement to purchase goods or services that is enforceable and legally binding on Ingevity and that specifies all significant terms, including fixed or minimum quantities to be purchased; fixed, minimum or variable price provisions; and the approximate timing of the transaction. We have included in the below disclosure all normal and recurring purchase orders, take-or-pay contracts and supply arrangements as well as other purchase commitments that management believes meet the above definition of a purchase obligation. See Note 19 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information.

	Payments due in period				
In millions	Total at December 31, 2018	2019	2020-2021	2022-2023	2024 and beyond
Contractual obligations					
Debt maturities	$678.9	$13.3	$ 46.9	$ 318.7	$300.0
Contractual interest [1]	156.6	27.4	52.5	43.0	33.7
Capital lease obligations [2][3]	132.0	6.1	12.2	12.2	101.5
Operating lease obligations[3]	74.0	21.9	30.5	15.7	5.9
Purchase obligations	166.4	166.1	0.3	—	—
Pending Acquisition [4]	652.5	652.5	—	—	—
Total	$1,860.4	$887.3	$ 142.4	$ 389.6	$441.1

(1) Contractual interest is the interest we are contracted to pay on our long-term debt obligations. We had $375.0 million of long-term debt subject to variable interest rates at December 31, 2018 and $303.9 million of debt subject to fixed interest rates. The rate assumed for the variable interest component of the contractual interest obligation was the rate in effect at December 31, 2018. Variable rates are determined by the market and will fluctuate over time.

(2) Amounts include the interest payments under the capital lease as well as the principal payment due in 2027.

(3) Capital and operating lease obligations are presented in accordance with ASC 840 "Leases". We adopted ASC 842 "Leases" effective January 1, 2019. See Note 4 to the Consolidated Financial Statements included within Part II. Item 8 of this Form 10-K for more information on the adoption and the impact to our Consolidated Financial Statements.