TENNECO INC
Form 10-K
March 18, 2019
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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K
(Mark One)
þ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018
OR
¨ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
Commission file number 1-12387
TENNECO INC.
(Exact name of registrant as specified in its charter)

Delaware (State or other jurisdiction of incorporation or organization)	76-0515284 (I.R.S. Employer Identification No.)
500 North Field Drive Lake Forest, IL (Address of principal executive offices)	60045 (Zip Code)

Registrant’s telephone number, including area code: (847) 482-5000
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each Exchange on which registered
Class A Voting Common Stock, par value $.01 per share	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None
Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes þ No ¨
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ¨ No þ
Note — Checking the box above will not relieve any registrant required to file reports pursuant to Section 13 or 15(d) of the Exchange Act from their obligations under those Sections.
Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes þ No ¨
Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes þ No ¨
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant’s knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. þ

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer”, “smaller reporting company” and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	þ	Accelerated filer	¨
Non-accelerated filer	¨	Smaller reporting company	¨
		Emerging growth company	¨

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ¨

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant as of June 30, 2018, computed by reference to the price at which the registrant's common stock was last sold on the New York Stock Exchange on June 30, 2018, was approximately $2.2 billion.

The number of shares of Class A Voting Common Stock, par value $0.01 per share: 57,126,127 shares outstanding as of March 11, 2019. The number of shares of Class B Non-Voting Common Stock, par value $0.01 per share: 23,793,669 shares outstanding as of March 11, 2019.

Documents Incorporated by Reference:

Document	Part of the Form 10-K into which incorporated
Portions of Tenneco Inc.’s Definitive Proxy Statement for the Annual Meeting of Stockholders to be held May 15, 2019	Part III

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

This report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 concerning, among other things, our prospects and business strategies. These forward-looking statements are included in various sections of this report. The words "may," "will," "believe," "should," "could," "plan," "expect," "anticipate "estimate," and similar expressions (and variations thereof), identify these forward-looking statements. Although we believe that the expectations reflected in these forward-looking statements are based on reasonable assumptions, these expectations may not prove to be correct. Because these forward-looking statements are also subject to risks and uncertainties, actual results may differ materially from the expectations expressed in the forward-looking statements. Important factors that could cause actual results to differ materially from the expectations reflected in the forward-looking statements include:

- general economic, business and market conditions;
- our ability to source and procure needed materials, components and other products and services in accordance with customer demand and at competitive prices;
- the cost and outcome of existing and any future claims, legal proceedings or investigations, including, but not limited to, any of the foregoing arising in connection with the ongoing global antitrust investigation, product performance, product safety or intellectual property rights;
- changes in consumer demand, prices and our ability to have our products included on top selling vehicles, including any shifts in consumer preferences away from historically higher margin products for our customers and us, to other lower margin vehicles, for which we may or may not have supply arrangements, and the cyclical nature of the global vehicle industry, including the performance of the global aftermarket sector and the impact of vehicle parts' longer product lives;
- changes in consumer demand for our OE or aftermarket products, or changes in automotive and commercial vehicle manufacturers' production rates and their actual and forecasted requirements for our products, due to difficult economic conditions and/or regulatory or legal changes affecting internal combustion engines and/or aftermarket products;
- our dependence on certain large customers, including the loss of any of our large original equipment manufacturer ("OE") customers (on whom we depend for a substantial portion of our revenues), or the loss of market shares by these customers if we are unable to achieve increased sales to other OE customers or any change in customer demand due to delays in the adoption or enforcement of worldwide emissions regulations;
- new technologies that reduce the demand for certain of our products or otherwise render them obsolete;
- our ability to introduce new products and technologies that satisfy customers' needs in a timely fashion;
- the overall highly competitive nature of the automotive and commercial vehicle parts industries, and any resultant inability to realize the sales represented by our awarded book of business (which is based on anticipated pricing and volumes over the life of the applicable program);
- changes in capital availability or costs, including increases in our cost of borrowing (i.e., interest rate increases), the amount of our debt, our ability to access capital markets at favorable rates, and the credit ratings of our debt;
- our ability to comply with the covenants contained in our debt instruments;
- our working capital requirements;
- our ability to successfully execute cash management and other cost reduction plans, and to realize the anticipated benefits from these plans;
- risks inherent in operating a multi-national company, including economic conditions, such as currency exchange and inflation rates, and political conditions in the countries where we operate or sell our products, adverse changes in trade agreements, tariffs, immigration policies, political stability, and tax and other laws, and potential disruptions of production and supply;
- increasing competition from lower cost, private-label products;
- damage to the reputation of one or more of our leading brands;

- the impact of improvements in automotive parts on aftermarket demand for some of our products;
- industrywide strikes, labor disruptions at our facilities or any labor or other economic disruptions at any of our significant customers or suppliers or any of our customers' other suppliers;
- developments relating to our intellectual property, including our ability to changes in technology;
- costs related to product warranties and other customer satisfaction actions;
- the failure or breach of our information technology systems, including the consequences of any misappropriation, exposure or corruption of sensitive information stored on such systems and the interruption to our business that such failure or breach may cause;

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- the impact of consolidation among vehicle parts suppliers and customers on our ability to compete in the highly competitive automotive and commercial vehicle supplier industry;
- changes in distribution channels or competitive conditions in the markets and countries where we operate;
- the evolution towards autonomous vehicles and car and ride sharing;
- customer acceptance of new products;
- our ability to successfully integrate, and benefit from, any acquisitions that we complete;
- our ability to effectively manage our joint ventures and other third-party relationships;
- the potential impairment in the carrying value of our long-lived assets, goodwill, other intangible assets or our deferred tax assets;
- the negative impact of fuel price volatility on transportation and logistics costs, raw material costs, discretionary purchases of vehicles or aftermarket products and demand for off-highway equipment;
- increases in the costs of raw materials or components, including our ability to successfully reduce the impact of any such cost increases through materials substitutions, cost reduction initiatives, customer recovery and other methods;
- changes by the Financial Accounting Standards Board or the Securities and Exchange Commission of authoritative generally accepted accounting principles or policies;
- changes in accounting estimates and assumptions, including changes based on additional information;
- any changes by the International Organization for Standardization (ISO) or other such committees in their certification protocols for processes and products, which may have the effect of delaying or hindering our ability to bring new products to market;
- the impact of the extensive, increasing and changing laws and regulations to which we are subject, including environmental laws and regulations, which may result in our incurrence of environmental liabilities in excess of the amount reserved or increased costs or loss of revenues relating to products subject to changing regulation;
- potential volatility in our effective tax rate;
- disasters, such as fires, earthquakes and flooding, and any resultant disruptions in the supply or production of goods or services to us or by us, in demand by our customers or in the operation of our system, disaster recovery capabilities or business continuity capabilities;
- acts of war and/or terrorism, as well as actions taken or to be taken by the United States and other governments as a result of further acts or threats of terrorism, and the impact of these acts on economic, financial and social conditions in the countries where we operate;
- pension obligations and other postretirement benefits;
- our hedging activities to address commodity price fluctuations; and
- the timing and occurrence (or non-occurrence) of other transactions, events and circumstances which may be beyond our control.

In addition, important factors related to the acquisition of Federal-Mogul LLC ("Federal-Mogul") and the planned separation of our company into a powertrain technology company and an aftermarket and ride performance company that could cause actual results to differ materially from the expectations reflected in the forward-looking statements, including:

- the risk that the benefits of the acquisition of Federal-Mogul, including synergies, may not be fully realized or may take longer to realize than expected;
- the risk that the acquisition of Federal-Mogul may not advance our business strategy;
- the risk that we may experience difficulty integrating or separating employees or operations;
- the risk that the transaction may have an adverse impact on existing arrangements with us, including those related to transition, manufacturing and supply services and tax matters, our ability to retain and hire key personnel or our ability to maintain relationships with customers, suppliers or other business partners;
- the risk that the company may not complete a separation of its powertrain technology business and its aftermarket and ride performance business (or achieve some or all of the anticipated benefits of such a separation);

- the risk that the combined company and each separate company following the spin-off will underperform relative to our expectations;
- the ongoing transaction costs and risk that we may incur greater costs following the spin-off; and
- the risk that the spin-off is determined to be a taxable transaction.

The risks included here are not exhaustive. Refer to “Part I, Item 1A — Risk Factors” of this report for further discussion regarding our exposure to risks. Additionally, new risk factors emerge from time to time and it is not possible for us to predict all such risk

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factors, nor to assess the impact such risk factors might have on our business or the extent to which any factor or combination of factors may cause actual results to differ materially from those contained in any forward-looking statements. Given these risks and uncertainties, investors should not place undue reliance on forward-looking statements as a prediction of actual results. Unless otherwise indicated in this report, the forward-looking statements in this report are made as of the date of this report, and, except as required by law, the Company does not undertake any obligation, and disclaims any obligation, to publicly disclose revisions or updates to any forward-looking statements.

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PART I
ITEM 1.BUSINESS.
TENNECO INC.
General
Our company, Tenneco Inc., designs, manufactures and sells innovative products and services for light vehicle, commercial truck, off-highway, industrial and aftermarket customers. We serve both original equipment manufacturers ("OEM") and replacement markets worldwide. We are one of the world's leading manufacturers of clean air, powertrain and ride performance products and systems for light vehicle, commercial truck, off-highway, industrial and aftermarket customers. As used herein, the term "Tenneco," "we," "us," "our," or the "Company" refers to Tenneco Inc. ar its consolidated subsidiaries.

We were incorporated in Delaware in 1996. In 2005, we changed our name from Tenneco Automotive Inc. to Tenneco Inc. The name Tenneco better represents the expanding number of markets we serve through our commercial truck and off-highway businesses. Our Class A Voting Common Stock is traded on the New York Stock Exchange ("NYSE") under the symbol "TEN."

On October 1, 2018, we completed the acquisition of Federal-Mogul LLC ("Federal-Mogul"), a global supplier of technology and innovation in vehicle and industrial products for fuel economy, emissions reductions, and safety systems. Federal-Mogul serves the world's foremost OEM and servicers ("OES", and together with OEM, "OE") of automotive, light, medium and heavy-duty commercial vehicles, off road, agricultural, marine, rail, aerospace, power generation and industrial equipment, as well as the worldwide aftermarket. We expect to separate our businesses to form two new independent, publicly traded companies, an Aftermarket and Ride Performance company and a new Powertrain Technology company, in the second half of 2019. See Note 3—Acquisitions and Divestitures to our consolidated financial statements in Item 8 — "Financial Statements and Supplementary Data" for additional information.

As a result of the Acquisition, the number of our reportable segments increased from three to five segments, consisting of the following: our historical Clean Air, Ride Performance and Aftermarket segments and the newly acquired Powertrain and Motorparts segments.

On January 10, 2019, we closed on our acquisition of Öhlins Racing A.B. ("Öhlins"), a Sweden-based company. Öhlins offers suspension systems and components to automotive, and motorsport industries.

Our Internet address is http://www.tenneco.com. We make our proxy statements, annual report on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports, as filed with or furnished to the Securities and Exchange Commission (SEC), available free of charge on our Internet website as soon as reasonably practicable after submission to the SEC. Securities ownership reports on Forms 3, 4 and 5 are also available free of charge on our website as soon as reasonably practicable after submission to the SEC. The contents of our website are not, however, a part of this report.

Available Information
Our Audit Committee, Compensation Committee and Nominating and Governance Committee Charters, Corporate Governance Principles, Stock Ownership Guidelines, Audit Committee policy regarding accounting complaints, Code of Ethical Conduct for Financial Managers, Code of Conduct, Policy and Procedures for Transactions with Related Persons, Equity Award Policy, Clawback Policy, Insider Trading Policy, policy for communicating with the Board of Directors, and Audit Committee policy regarding the pre-approval of audit, non-audit, tax and other services are available free of charge on our website at www.tenneco.com. In addition, we will make a copy of any of these documents available to any person, without charge, upon written request to Tenneco Inc., 500 North Field Drive, Lake

Forest, Illinois 60045, Attn: General Counsel. We intend to satisfy the disclosure requirements under Item 5.05 of Form 8-K and applicable NYSE rules regarding amendments to, or waivers of, our Code of Ethical Conduct for Financial Managers and Code of Conduct by posting this information on our website at www.tenneco.com.

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DESCRIPTION OF OUR BUSINESS

We design, manufacture and sell innovative products and services for light vehicle, commercial truck, off-highway, industrial and aftermarket customers, and generated revenues of $11.8 billion in 2018. We serve both original equipment (OE) manufacturers and replacement markets worldwide. Our portfolio of the industry's most well-respected enduring brands include Monroe®, Champion®, Öhlins®, MOOG®, Walker®, Fel-Pro®, Wagner®, Ferodo®, Rancho®, Thrush®, National®, and Sealed Power®, among others. We seek to leverage our OE product engineering and development capability, manufacturing know-how, and expertise in managing a broad and deep range of replacement parts to service the aftermarket. We effectively manage the life cycle of a broad range of products to a diverse customer base.

As a parts supplier, we produce individual component parts for vehicles as well as groups of components that are combined as modules or systems within vehicles. These parts, modules, and systems are sold globally to the world's leading light vehicle and commercial truck manufacturers as well as aftermarket customers, including independent warehouse distributors, distributors, engine rebuilders, retail parts stores, mass merchants, and service chains.

On October 1, 2018, we closed the acquisition of Federal-Mogul, (the "Acquisition") pursuant to the Membership Interest Purchase Agreement, dated as of April 10, 2018, by and among us, Federal-Mogul, American Entertainment Properties Corp. ("AEP") and Icahn Enterprises L.P. ("IEP"). We agreed to use our reasonable best efforts to pursue the separation of the combined company's aftermarket and ride performance business and its powertrain technology business into two new independent, publicly traded companies in a spin-off transaction that is expected to be treated as a tax-free reorganization for U.S. federal income tax purposes. We expect the spin-off to be completed in the second half of 2019.

As a result of the Acquisition, the number of our reportable segments increased from three to five segments, consisting of the following: our historical Clean Air, Ride Performance and Aftermarket segments and the newly acquired Powertrain and Motorparts segments.

Our Industry

The parts industry for vehicles and engines is generally separated into two categories, both of which we operate within:(1) "original equipment" or "OE" parts that are sold in large quantities directly for use by manufacturers of light vehicles and commercial vehicles and (2) "aftermarket" or replacement parts that are sold in varying quantities to wholesalers, retailers and installers. Light vehicles are comprised of passenger cars and light trucks, which include sport-utility vehicles (SUVs), crossover vehicles (CUVs), pick-up trucks, vans and multi-purpose passenger vehicles. Commercial vehicles include commercial trucks and off-highway equipment.

Global OE Industry

Products for the global OE industry are sold directly to OE manufacturers that use these parts, which include components, systems, subsystems, and modules, in the manufacture of new light and commercial vehicles. Demand for component parts in the OE market is generally a function of the number of new vehicles/engines produced, which is driven by macroeconomic conditions and other factors such as fuel prices, consumer confidence, employment trends, regulatory requirements, and trade agreements. Although OE demand is tied to planned vehicle production, parts suppliers also have the opportunity to grow revenues by increasing their product content per vehicle. Companies, like us, with a global presence, leading technology and innovation, and advanced product, engineering, manufacturing, and customer support capabilities are best positioned to take advantage of these opportunities.

Key Industry Trends Affecting the Global OE Industry

Global Light Vehicle Production

Global light vehicle production is expected to grow by approximately 2% annually from 2018 to 2025, reaching nearly 109 million units by 2025, according to leading forecasting company IHS Markit. In 2018, global light vehicle production declined 1% versus the previous year, including a 1% decline in North America, 1% decline in Europe and 4% decline in China, with increases of 3% in South America and 6% in India. Global light vehicle production increased 2% in 2017 and 5% in 2016.

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Intelligent Suspension, Autonomous Driving and Mobility

There are a number of trends that are driving “Auto 2.0,” defined as the transformation of cars into hybrid systems, electric and fully autonomous vehicles, the business model shift from individual car ownership to ride-sharing, and multi-model forms of mobility. For instance, higher levels of autonomy will drive increased passenger expectations for a comfortable ride, which, in turn, will create additional content opportunities per vehicle and heighten demand for advanced suspension products, including full-corner/around-the-wheel intelligent suspension systems.

Advanced suspension technology is expected to grow with adoption led by global OE manufacturers. Increased connectivity also presents additional prospects for active suspension systems, predictive vehicle diagnostics, and system-based integration within the vehicle as well as broader vehicle to everything (“V2X”) communications. The addition of Öhlins to the portfolio is expected to accelerate the development of advanced OE intelligent suspension solutions, while also fast-tracking time to market. This acquisition is yet another example of our strategy to leverage key technologies that will better position us to take advantage of secular trends. It will also enhance our portfolio in broader mobility markets through the addition of Öhlins’ range of premium OE and aftermarket automotive and motorsports performance products.

Maturing powertrain technology, including the increased adoption of hybrid and fully electric powertrains, will create further opportunities for increased ride performance and noise, vibration and harshness (“NVH”) capabilities, as consumers look for smoother, quieter and more efficient rides. Our capability in both the suspension and NVH performance materials categories provide the opportunity to maximize driving comfort and ride performance for motorists worldwide.

Shared mobility describes a range of transportation options that involve the shared use of a vehicle, motorcycle, scooter, bicycle or other travel mode; it provides users with short-term access to a transportation mode on an as-needed basis. Shared mobility may reduce vehicle volumes in established markets, but it also provides an opportunity for us to develop higher-mileage, durable solutions to meet the needs of new mobility fleets. Additionally, ride comfort and durability will become increasingly important differentiators as consumers increasingly take advantage of the sharing economy.

Focus on Fuel Economy, Reduced Emissions and Alternative Energy Sources

Increased fuel economy and decreased vehicle emissions are of great importance to OE suppliers, as customers, consumers and legislators continue to demand more efficient and cleaner operating vehicles. Increasingly stringent fuel economy standards and environmental regulations are driving OE customers to focus on new technologies including downsized, higher-output and turbocharged gasoline and diesel engines, and hybrid electric and pure electric powertrains, such as fuel cell and battery powered cars. We continue to expand our investment around the world, in regions such as North America, Europe, China, India, and Japan to capitalize on the growing demand for environmentally friendly solutions for light vehicle, commercial truck and off-highway applications driven by environmental regulations in these regions.

The products that our clean air segment provides reduce the tailpipe emissions of criteria pollutants. In addition, regulations have been adopted to regulate greenhouse gas emissions of carbon dioxide. Reducing CO2 emissions requires improving fuel economy; as a result improved combustion efficiency and reduction of vehicle mass have become priorities. As a leading supplier of clean air systems with strong technical capabilities, we believe we are well positioned to benefit from the more rigorous environmental standards being adopted around the world.

The demand for smaller but more powerful engines requires more technology per engine to withstand the higher output requirements, which we estimate will result in an increase in content per engine for our powertrain business. With a global manufacturing presence, we believe we are well-positioned to meet expectations of our global customers. For the foreseeable future, it is expected that gasoline and diesel engines will remain the dominant powertrain for cars (including hybrids), heavy-duty, and industrial applications. We are equally capable of providing components for both gasoline and diesel engines.

Increasing Technologically Sophisticated Content

As end users and consumers continue to demand vehicles with improved performance, safety and functionality at competitive prices, the components and systems in these vehicles are becoming technologically more advanced and sophisticated. Mechanical functions are being replaced with electronics; and mechanical and electronic devices are being integrated into single systems. More stringent emission and other regulatory standards are increasing the complexity of the systems as well.

To remain competitive as a parts and systems supplier, we invest in engineering, research and development. We also fund and sponsor university and other independent research to advance development efforts. By investing in technology, we have been able to expand our product offerings and penetrate new markets.

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Enhanced Vehicle Safety and Handling

To serve the needs of their customers and meet government mandates, OE manufacturers are seeking parts suppliers that invest in new technologies, capabilities and products that advance vehicle safety and handling, such as roll-over protection systems, intelligent suspension, and safer, more durable materials. Those suppliers, such as us, that are able to offer such innovative products and technologies have a distinct competitive advantage. We offer adjustable and adaptive damping as well as semi-active suspension systems designed to improve vehicle stability, handling and control.

We also are a global leader in the development of leading friction formulas that improve vehicle stopping distances and performance. As the commercial truck customers migrate to air disc brake systems, we remain at the forefront of providing the brake friction necessary for these new systems.

Many of our aftermarket products directly affect vehicle performance. Product quality, reliability, and consistency are paramount to our end-customers, the majority of whom are professional service technicians. Our engineering prowess and product capabilities from chassis to braking allow us to provide a complete around-the-wheel offering. Additionally, we have a number of braking products including disc pads for passenger cars, motorcycles and commercial vehicles; drum brake shoes and CV drum brake lining; and brake accessories including rotors, drums, hydraulics, hardware and brake fluid.

Sourcing by OE Manufacturers

As OE manufacturers expand their reach, many are looking for suppliers with a global footprint and the capability to supply them with full system integration and solutions, rather than individual standalone products.

Because of these trends, OE manufacturers are increasingly seeking suppliers capable of supporting vehicle platforms on a global basis. They want suppliers like us with design, production, engineering and logistics capabilities that can be accessed not just in North America and Europe but also in emerging markets such as India and China. OE manufacturers have standardized on global platforms, designing basic mechanical structures suitable for a number of similar vehicle models and are able to accommodate different features across regions. This standardization will drive growth in production of light vehicles designed on global platforms. Accordingly, global platforms, identified as platforms produced in more than one region, are expected to grow.

As OE manufacturers look to simplify and streamline design, they are also increasingly selecting suppliers like us that provide fully-engineered, integrated systems and solutions. OE manufacturers have steadily outsourced more of the design and manufacturing of vehicle parts and systems to simplify the assembly process, lower costs and reduce development times. Furthermore, they have demanded from their parts suppliers fully integrated, functional modules and systems made possible with the development of advanced electronics in addition to innovative, individual vehicle components and parts that may not readily interface together.

Global Aftermarket Industry

Products for the global aftermarket are sold directly to a wide range of distributors, retail parts stores, and mass merchants that distribute these products to professional service providers, “do-it-yourself” consumers, and in some cases, directly to service chains. Demand for aftermarket products historically has been driven by four primary factors: (i) the number of vehicles in operation (“VIO”); (ii) the average age of VIO; (iii) vehicle usage trends; and (iv) component failure and wear rates. These factors, while applicable in all regions, vary depending on the composition of VIO and other factors.

Key trends affecting the Global Aftermarket Industry

Growth in the Number of VIO in both Mature and Emerging Markets

The global number of VIO is expected to grow, with the number of VIO in emerging markets such as China expected to increase substantially. The number of VIO in mature markets, such as North America and Europe, is also expected to grow, though at a lesser pace than the emerging markets. We have strong aftermarket positions in North America, Europe and South America and a growing aftermarket position in Asia. We expect there to be aftermarket growth opportunities in emerging markets such as China and India where the VIO are expected to increase and are investing to position ourselves as a leading aftermarket supplier in these regions. We are leveraging our market-leading

capabilities from mature markets and investing to develop the right distributor base, drive brand recognition, increase product coverage, build the supply chain and promote our experience as an OE-quality supplier.

Increase in the Average Age of Vehicles in Operation

The average age of VIO in North America and Europe has increased significantly this century, and is expected to increase further. Increases in the average age of VIO will drive the need for maintenance and repair work, thereby increasing the overall demand for aftermarket replacement parts in North America and Europe. The average age of VIO in China is expected to increase, which we believe will lead to continuing significant growth in the China aftermarket.

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Extended Product Life of Automotive Parts

The average useful life of automotive parts, both OE and replacement, has steadily increased in recent years due to technological innovations including longer-lasting materials. As a result, there are more vehicles on the road than ever before. Aftermarket suppliers are focused on reducing costs and providing product differentiation through advanced technology and recognized brand names. With our long history of technological innovation, iconic brands and operational efficiency, we believe we are well-positioned to leverage our products and technology.

Managing Complexity

We operate in a highly fragmented and dynamic industry and are among the few large aftermarket-focused suppliers globally. The increasing global vehicle population, brand and vehicle complexity, and need for rapid new part introduction, as well as new distribution channels (including online) continue to drive significant SKU proliferation and business complexity. Our recent investments in our supply chain and information technology capabilities are designed to manage this complexity, which we believe will be an important competitive differentiator.

Channel Consolidation

In the more mature markets of North America and Europe, there has been increasing consolidation in the aftermarket distribution channel with larger aftermarket distributors and retailers gaining market share. These distributors generally require larger, more capable suppliers that have the ability to provide world-class product expertise, category management capabilities, brand management and supply chain support, as well as a competitive manufacturing and sourcing network. We have undertaken many initiatives to support the value of our branded products to end-market consumers and diversify our revenue base.

Growth of Online Capabilities

Reaching consumers directly through online capabilities, including e-commerce, is expected to have an increasing effect on the global aftermarket industry and how aftermarket products are marketed and sold. The establishment of a robust online presence will be critical for suppliers regardless of whether they intend to participate directly in e-commerce. We invested heavily in online initiatives to improve our capabilities and connectivity to our end-customers, including a new online order management system, customer relationship management tools, global brand websites, and data analytics capabilities. We will continue to invest in these competencies. Additionally, consumers increasingly are utilizing online research prior to making buying or repair decisions. We will continue to expand our online presence in order to connect with our customers and more effectively communicate the value of our premium aftermarket brands.

Increase in Lower Cost, Private Label Brands

In many of our markets, there has been an increase in private label or store brands sold by retailers and distributors at a lower price point than premium brands of the same products. However, in many cases, retailers or wholesale distributors creating private label brands still rely on established suppliers, like us, to design and manufacture their private label products and, in some cases, utilize co-branding to support their private label offerings.

We have some of the strongest and most recognized brands in the automotive aftermarket. In addition, we expect to continue to invest in product innovation, marketing and brand support that differentiate our premium branded products for their quality while also supporting lower priced, mid- grade offerings. Additionally, we expect to continue to drive productivity and cost reduction efforts and enhance our already strong global sourcing capabilities to remain competitive in each product tier.

Resilience during Economic Downturn

Aftermarket products are largely stable, non-discretionary and less susceptible to cyclicality as customers often have no choice but to replace automotive parts that are worn. During the 2008 economic downturn, the number of consumers with the ability to purchase new vehicles declined and led to increased demand for aftermarket parts in order to keep older vehicles road-worthy. The resilience of the automotive aftermarket industry is exhibited by the fact that the U.S. light vehicle aftermarket has grown every year for the last 20 years, except for 2009 when industry sales declined by approximately 1.4% according to Automotive Aftermarket Suppliers Association (AASA).

Customers

We strive to develop long-standing business relationships with our customers around the world. We work collaboratively with our OE customers in all stages of production, including design, development, component sourcing, quality assurance, manufacturing and delivery. For both OE and aftermarket customers, we provide timely delivery of quality products at competitive prices and deliver customer service. With our diverse product mix and numerous facilities in major markets worldwide, we believe we are well positioned to meet customer needs.

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Our OE customers consist of automotive and commercial manufacturers as well as agricultural, off-highway, marine, railroad, aerospace, high performance, and power generation and industrial application manufacturers. We have well-established relationships with substantially all major American, European, and Asian automotive OE manufacturers.

The following customers accounted for 10% or more of our net sales in any of the last three years.

Customer	2018	2017	2016
General Motors Company	12%	14%	17%
Ford Motor Company	12%	13%	13%

Our aftermarket customers include independent warehouse distributors that redistribute products to local parts suppliers, distributors, engine rebuilders, retail parts stores, mass merchants and service chains. The breadth of our product lines, the strength of our leading marketing expertise, a sizable sales force, and supply chain and logistics capabilities are central to our success in the aftermarket. We have a large and diverse aftermarket customer base.

Competition

We operate in highly competitive markets. Customer loyalty is a key element of competition in these markets and is developed through long-standing relationships, customer service, high quality value-added products and timely delivery. Product pricing and services provided are other important competitive factors.

As a supplier of OE and aftermarket parts, we compete with the vehicle manufacturers, some of which are also customers of ours, and numerous independent suppliers. We believe we are meeting these competitive challenges by developing leading technologies, efficiently integrating and expanding our manufacturing and distribution operations, widening our product coverage within our core businesses, restructuring our operations and transferring production to best cost countries, and utilizing our worldwide technical centers to develop and provide value-added solutions to our customers.

Seasonality

Our businesses are somewhat seasonal. OE production is historically higher in the first half of the year compared to the second half. It typically decreases in the third quarter due to OE plant shutdowns for model changeovers and European holidays, and softens further in the fourth quarter due to reduced production during the end-of-year holiday season in North America and Europe. Shut-down periods in the rest of the world generally vary by country. Our aftermarket operations experience relatively higher demand during the spring as vehicle owners prepare for the summer driving season. While seasonality does impact our business, actual results may vary from the above trends due to global and local economic dynamics as well as industry-specific platform launches and other production-related events. Aftermarket sales tend not to be as adversely affected during periods of economic downturn, as consumers forgo new vehicle purchases and keep their vehicles longer, thereby increasing demand for repair and maintenance services.

The aftermarket is affected by changes in economic conditions, volatility in fuel prices, and expanding focus on environmental and energy conservation.

Order Fulfillment

For OE customers, we generally receive long-term production contracts for specific products supplied for particular vehicles. These supply relationships typically extend over the life of the related vehicle, subject to interim design and technical specification revisions, and do not require the customer to purchase a minimum quantity. In addition to customary commercial terms and conditions, long-term production contracts generally provide for annual price reductions based upon expected productivity improvements and other factors. Customers typically retain the right to terminate long-term production contracts, but we generally cannot terminate long-term production contracts. OE order fulfillment is typically manufactured in response to customer purchase order releases, and we ship directly from a manufacturing location to the customer for use in vehicle production and assembly. Accordingly, our manufacturing locations turn finished goods inventory relatively quickly, producing from on-hand raw materials and work-in-process inventory within relatively short manufacturing cycles. Significant risks to us include a change in vehicle or engine production, lower than expected vehicle or engine production by one or more of our OE customers, or termination of

the business based upon perceived or actual shortfalls in delivery, quality or value.

For our global aftermarket customers, we generally establish product line arrangements that encompass substantially all parts offered within a particular product line. In some cases, we will enter into agreements with terms ranging from one to three years that cover one or more product lines with fixed prices. Pricing is market responsive and subject to adjustment based upon competitive pressures, material costs, and other commercial factors. Global aftermarket order fulfillment is largely performed from finished goods inventory stocked in our worldwide distribution network. Inventory stocking levels in our distribution centers are established based upon historical and anticipated future customer demand.

Although customer programs typically extend to future periods, and although there is an expectation we will supply certain levels of OE production over such periods, we believe outstanding purchase orders and product line arrangements do not constitute firm

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orders. Firm orders are limited to specific and authorized customer purchase order releases placed with our manufacturing and distribution centers for actual production and order fulfillment. Firm orders are typically fulfilled as promptly as possible from the conversion of available raw materials and work-in-process inventory for OE orders, and from current on-hand finished goods inventory for aftermarket orders.

Clean Air Segment

We operate 64 clean air manufacturing facilities worldwide, of which 17 facilities are located in North and South America, 20 in Europe and 27 in Asia Pacific. We operate 16 of the manufacturing facilities in Asia Pacific through joint ventures in which we hold a controlling interest. We operate five clean air engineering and technical facilities worldwide and share three other such facilities with our ride performance operations. Of the five clean air engineering and technical facilities, one is located in North America, two in Europe, and two in Asia Pacific. In addition, one joint venture in which we hold a noncontrolling interest operates one manufacturing facility in Europe.

Through the recent acquisition of Federal-Mogul Powertrain, combined with our Clean Air emissions expertise, we are focused on delivering an optimized trade-off between fuel economy and emission control from the cylinder to the tailpipe. Specifically, Clean Air products and systems are designed to help global OE manufacturers in light vehicle, commercial truck and off-highway markets to meet global emissions regulations anywhere in the world. With significant investment in core sciences and technical capabilities, including combustion and thermal management, materials science and thermoelectrical energy, we are able to provide advance emissions solutions that solve unique technical challenges.

Our technologies are broken into four key product areas:

- Emissions Control Products — includes Dosing Systems, Advanced Mixers, Selective Catalytic Reduction, Gasoline and Diesel Particulate Filters and Catalytic Converters;
- Lightweighting and Thermal Management — includes Rankine Cycle Power Pack, Thermo-electric Generators, Thermoacoustic Converters, Heat Exchangers, Lightweight Aftertreatment Systems and Fabricated Manifolds;
- Acoustic Products — includes Muffler and Resonator Tuning Devices. Active Noise Cancellation, Signature Sound, Smart Sound and Electronic and Passive Valves; and
- Noise, Vibration and Harshness — includes Exhaust System Isolators, Lightweight Hanger Solutions and Modular Exhaust Dampers.

Our engineering capabilities include advanced predictive design tools, advanced prototyping processes and state-of-the-art testing equipment. These technological capabilities make us a “full system” integrator and supplier to the OE manufacturers, supplying optimized emission control systems from the manifold to the tailpipe, while delivering emission regulatory compliance and acoustic noise control. Our technology includes the use of urea injectors, electronic controls and software for use in selective catalytic reduction (SCR) and other exhaust after-treatment systems. We also offer a complete suite of alternative full system NOx aftertreatment technologies, including the Hydrocarbon Lean NOx Catalyst (HC-LNC) technology.

Vehicle emission control products and systems play a critical role in safely conveying noxious exhaust gases away from the passenger compartment and reducing the level of pollutants and engine exhaust noise emitted to acceptable levels. Precise engineering of the exhaust system - which extends from the manifold that connects an engine’s exhaust ports to an exhaust pipe, to the catalytic converter that eliminates pollutants from the exhaust, and to the muffler that modulates noise emissions - leads to a pleasantly tuned engine sound, reduced pollutants and optimized engine performance.

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We design, manufacture and distribute a variety of clean air products and systems. The following table sets forth a description of the largest product lines sold by our Clean Air segment:

Product	Description
Catalytic converters and diesel oxidation catalysts	Devices consisting of a substrate coated with precious metals enclosed in a steel casing used to reduce harmful gaseous emissions such as carbon monoxide.
Diesel particulate filters (DPFs)	Devices to capture and regenerate particulate matter emitted from diesel engines.
Burner systems	Devices which actively combust fuel and air inside the exhaust system to create extra heat for DPF regeneration, or to improve the efficiency of SCR systems.
Lean NOx traps	Devices which reduce nitrogen oxide (NOx) emissions from diesel powertrains using capture and store technology.
Hydrocarbon vaporizers and injectors	Devices to add fuel to a diesel exhaust system in order to regenerate particulate filters or Lean NOx traps.
SCR systems	Devices which reduce NOx emissions from diesel powertrains using urea mixers and injected reductants such as Verband der Automobil industrie e.V.'s AdBlue® or Diesel Exhaust Fluid (DEF).
SCR-coated diesel particulate filters (SDPF) systems	Lightweight and compact devices combining the SCR catalyst and the particulate filter onto the same substrate for reducing NOx and particulate matter emissions.
Urea dosing systems	Systems comprised of a urea injector, pump, and control unit, among other parts, that dose liquid urea onto SCR catalysts.
Four-way catalysts	Devices that combine a three-way catalyst and a particulate filter onto a single device by having the catalyst coating of a converter directly applied onto a particulate filter.
Alternative NOx reduction technologies	Devices which reduce NOx emissions from diesel powertrains, by using, for example, alternative reductants such as diesel fuel, E85 (85% ethanol, 15% gasoline), or solid forms of ammonia.
Mufflers and resonators	Devices to provide noise elimination and acoustic tuning.
Fabricated exhaust manifolds	Components that collect gases from individual cylinders of a vehicle's engine and direct them into a single exhaust pipe. Fabricated manifolds can form the core of an emissions module that includes an integrated catalytic converter (maniverter) and/or turbocharger.
Pipes	Utilized to connect various parts of both the hot and cold ends of an exhaust system.
Hydroformed assemblies	Forms in various geometric shapes, such as Y-pipes or T-pipes, which provide optimization in both design and installation as compared to conventional pipes.
Elastomeric hangers and isolators	Used for system installation and elimination of noise and vibration, and for the improvement of useful life.
Aftertreatment control units	Computerized electronic devices that utilize embedded software to regulate the performance of active aftertreatment systems, including the control of sensors, injectors, vaporizers, pumps, heaters, valves, actuators, wiring harnesses, relays and other mechatronic components.

For the catalytic converters, SCR systems and other substrate-based devices we sell, we need to procure substrates coated with precious metals or in the case of catalytic converter systems only, purchase the complete systems. We obtain these components and systems from third parties, often at the OE manufacturer's direction, or directly from OE vehicle and engine manufacturers. See Item 7. "Management's Discussion and Analysis of Financial Condition and Results of Operations" for more information on our sales of these products.

Powertrain Segment

We operate 85 manufacturing sites in 19 countries, serving a large number of major automotive, heavy-duty, marine and industrial customer worldwide. Powertrain has also invested globally in nonconsolidated affiliates that have

multiple manufacturing sites, mainly in Turkey and China.

Powertrain offers its customers a diverse array of market-leading products for OE applications, including pistons, piston rings, piston pins, cylinder liners, valvetrain products, valve seats and guides, ignition products, dynamic seals, bonded piston seals, combustion and exhaust gaskets, static gaskets and seals, rigid heat shields, engine bearings, industrial bearings, bushings and washers, systems protection sleeves, acoustic shielding and flexible heat shields.

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We design, manufacture and distribute a variety of powertrain products and systems. The following table sets forth a description of the largest product lines sold by our Powertrain segment:

Product	Description
Pistons	Pistons convert the energy created by the combustion event into mechanical energy to drive a car; Pistons can be made from aluminum or steel, both casted and forged; Highly efficient engines impose high demands on pistons in terms of rigidity and temperature resistance.
Piston rings	Piston rings are mounted on the piston to seal the combustion chamber while the piston is moving up and down; Modern rings need to resist high temperature and very abrasive environments without significant wear; Rings are critical for low oil consumptions.
Cylinder liners	Cylinder liners, or sleeves, are specially engineered where surfaces formed within the engine block, working in tandem with the piston and ring, as the chamber in which the thermal energy of the combustion process is converted into mechanical energy.
Valve seats and guides	Valve seats and guides are produced from powdered metal based on sophisticated metal-ceramic structures to meet extreme requirements for hardness.
Bearings	Bearings provide the low-friction environment for rotating components like crankshafts and camshafts; Modern bearings are able to deal with very low viscosity oil even in highly repetitive motions like in stop/start-conditions.
Spark plugs	Modern spark plugs for engines fueled by gasoline or natural gas have to ignite fuel even at very high combustion pressure and with very clean fuel-air mixture - combined with extended life expectation well over 100,000 miles for turbo-charged engines.
Valvetrain products	Valvetrain products include mainly engine valves but also retainers, rotators, cotters, and tappets for use in both diesel and gas engines; the most demanding applications require sodium-filled hollow valves for fast heat dissipation.
System protection	System protection products include protection sleeves for wire harness and for oil and water tubes as well as acoustic and EMI/RFI shielding, heat and abrasion protection, and safety/ crash protection for cables and tubes for engines and cars.
Seals and gaskets	Cylinder-head gaskets and other hot and cold gaskets are sealing engines and engine components; dynamic and static seals protecting rotating engine and transmission components against oil and gas leakages. Such seals and gaskets are made from high-alloyed steel as well as from sophisticated rubber and polymers.

Ride Performance Segment

We operate 25 ride performance manufacturing facilities worldwide, of which 10 facilities are located in North and South America, seven in Europe and South Africa, and eight in Asia Pacific. We operate two of the facilities through joint ventures in which we hold a controlling interest, one in Europe and another one in Asia. We operate seven engineering and technical facilities worldwide and share three other such facilities with our clean air operations. Of the seven ride performance engineering and technical facilities, two are located in North America, three in Europe and South America, and two in Asia Pacific.

Within each of our ride performance manufacturing facilities, operations are organized by product (e.g., shocks, struts and vibration control products) and include computer numerically controlled and conventional machine centers; tube milling and drawn-over-mandrel manufacturing equipment; metal inert gas and resistance welding; powdered metal pressing and sintering; chrome plating; stamping; and assembly/test capabilities. Our manufacturing systems incorporate cell-based designs, allowing work-in-process to move through the operation with greater speed and flexibility.

In designing our shock absorbers and struts, we use advanced engineering and test capabilities to provide product reliability, endurance and performance. Our engineering capabilities feature advanced computer-aided design equipment and testing facilities. Our dedication to innovative solutions has led to such technological advances as:

- Adaptive damping systems — adapt to the vehicle’s motion to better control undesirable vehicle motions;
- Electronically adjustable suspensions — change suspension performance based on a variety of inputs such as steering, braking, vehicle height, and velocity; and
- Air leveling systems — manually or automatically adjust the height of the vehicle.

Superior ride control is governed by a vehicle’s suspension system, including shock absorbers and struts. Shock absorbers and struts maintain the vertical loads placed on vehicle tires, helping keep the tires in contact with the road. Vehicle steering, braking, acceleration and safety depend on maintaining contact between the tires and the road. Worn shocks and struts can allow excessive transfer of the vehicle’s weight - from side to side, known as “roll;” from front to rear, called “pitch;” or up and down, “bounce.” Because shock absorbers and struts are designed to control the vertical loads placed on tires, they provide resistance to excessive roll, pitch and bounce.

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We design, manufacture and distribute a variety of ride performance products and systems. The following table sets forth a description of the largest product lines sold by our Ride Performance segment:

Product	Description
Shock absorbers and struts	A broad range of mechanical shock absorbers and related components for light- and heavy-duty vehicles, including twin-tube and monotube shock absorbers and a complete line of struts and strut assemblies for light vehicles. Shock absorbers and struts maintain the vertical loads placed on vehicle tires, helping keep tires in contact with the road.
Monroe® intelligent suspension portfolio	An extensive product portfolio of advanced electronically controlled ride performance technology, which improve ride quality and vehicle handling: Kinetic ® suspension technology - A suite of roll-control and nearly equal wheel-loading systems ranging from simple mechanical systems to complex hydraulic systems featuring proprietary and patented technology. We have won the PACE Award for our Kinetic ® suspension technology; Dual-mode suspension - An adaptive suspension solution used for small- and medium-sized vehicles that provides drivers a choice of two suspension modes such as comfort and sport; DRiV— A digital electronic adaptive suspension system that adapts to road surfaces and vehicle control data through sensors, valves and intelligence located within the damper. CVSAe Continuously Variable 1 valve semi active suspension systems — Shock absorbers and suspension systems that electronically adjust a vehicle’s performance based on certain inputs such as steering, braking and other chassis control data CVSA2/Kinetic — Continuously Variable 2 valve semi active damping systems with hydraulic roll control (Kinetic H2) or hydraulic roll and pitch control (Kinetic X2).
NVH performance materials	Highly-engineered elastomer performance materials designed to reduce noise, vibration and harshness. Generally, rubber-to-metal bushings and mountings to reduce vibration between metal parts of a vehicle. Offerings include a broad range of suspension arms, rods and links for light- and heavy-duty vehicles.

On January 10, 2019, we closed on our acquisition of Öhlins Racing A.B. (“Öhlins”), a Sweden-based company. Öhlins offers suspension systems and components to automotive and motorsport industries.

Aftermarket Segment

We operate five Aftermarket production facilities worldwide, two in North America, one in Europe, and two in Asia Pacific. We share engineering testing facilities with our clean air and ride performance operations. In addition, we operate 22 distribution centers worldwide, four in North America, one in South America, 14 in Europe, and three in Asia Pacific. Eight of these are third party logistics providers.

The following table sets forth a description of the largest product categories sold by our Aftermarket segment:

Product	Description	Select Brands
Ride control	Ride Control parts include a broad range of mechanical shock absorbers and related components as well as struts and strut assemblies. Shock absorbers and struts maintain the vertical loads placed on vehicle tires, helping keep the tires in contact with the road.	Monroe®, Monroe® Reflex® Monroe® Adventure™, Rancho®, Quick-Strut®, Gas-Matic®, Sensa-Trac®, Quick-Strut® and Gas-Magnum®
NVH performance	Highly-engineered elastomer performance materials designed to reduce noise, vibration and harshness. Generally,	Clevite® Elastomers and Axios™

materials	rubber-to-metal bushings and mountings to reduce vibration between metal parts of a vehicle. Offerings include a broad range of suspension arms, rods and links for light- and heavy-duty vehicles.	
Emission control	Mufflers provide noise elimination and acoustic tuning. Pipes that connect various parts of the hot and cold exhaust system and catalytic converters. In addition, specialty exhaust products for heavy-duty and high performance vehicle applications.	Walker®, Walker® Perfection, Quiet-Flow®, Tru-Fit®, Thush®, Fonos ™ Mega-Flow® and DynoMax®

Motorparts Segment

We operate 31 manufacturing sites in 14 countries, 36 distribution centers and warehouses in 10 countries, 11 engineering and technical centers in 6 countries, and 11 technical service centers in two countries.

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We engineer, manufacture, source, and distribute a broad portfolio of products in the global vehicle aftermarket while also servicing the OE/OES markets with products including braking, wipers, and a limited range of chassis components. Motorparts' products are designed to enhance safety, durability, and vehicle performance, while providing ease of installation. Motorparts' products are utilized in vehicle braking systems and also include a wide variety of chassis, engine, sealing, wiper, filter, lighting, and other general maintenance applications. Motorparts uses market analytics, supply chain expertise, brand and product line management, innovative technology, manufacturing, sourcing, and distribution capabilities to satisfy its customers' requirements. On March 1, 2019, we completed the sale of substantially all of the global OE and aftermarket wipers business.

The following table sets forth a description of the largest product categories sold by our Motorparts segment:

Product	Description	Select Brands
Chassis	Chassis parts include ball joints, tie rod ends, sway bar links, hub assemblies, anti-friction bearings and universal joints, strut assemblies, idler arms, pitman arms, and control arms. These components affect vehicle steering and vehicle ride quality.	MOOG®, QuickSteer® and National®
Braking	Braking products include disc pads for passenger cars, motorcycles and commercial vehicles; drum brake shoes and CV drum brake lining; and brake accessories including rotors, drums, hydraulics, hardware and brake fluid. These products provide stopping ability, a safety feature on all vehicles.	Wagner®, Ferodo®, Jurid®, Beck Arnley® and Abex®
Sealing and Engine	Gaskets and seals create a barrier between two surfaces to contain fluids, pressure, and gases while keeping out dust and other contaminants. There are numerous areas of application including engine covers, oil pans, intake manifolds, shaft seals, transmission covers, and differential covers.	Fel-Pro®, Payen®, Goetze® and National®
Maintenance and Other	Filtration - Filtration parts include oil, air, cabin, fuel, and other filters for both light and commercial vehicles. These components prevent harmful contaminants contained in liquids and gases from passing through vehicle components and potentially leading to premature wear or failure. Lighting - Lighting products include forward lighting capsules, miniature light bulbs, LED lighting and sealed beams for virtually every application on cars, trucks, commercial vehicles and other off-road vehicles. Lighting improves driver visibility and safety. Ignition - Ignition products include spark plugs, glow plugs, ignition coils, wires, harnesses, and accessories for automotive, commercial, lawn and garden, marine, and industrial applications.	Interfil®, Champion® and Beru®

Sales, Marketing and Distribution

We have separate and distinct sales and marketing efforts for our OE and aftermarket customers.

For OE sales, our sales and marketing team is an integrated group of sales professionals, including skilled engineers and program managers, who are organized globally by customer business unit and product type (e.g., Ride Performance, Clean Air, and Powertrain). Our sales and marketing teams are focused on meeting and exceeding our customer's needs by delivering engineered products and services on time; maximizing profit for our investors while financing continued growth and product development; and developing a common system approach to create a superior customer experience. Our teams provide the appropriate mix of operational and technical expertise needed to interface successfully with the OE manufacturers. Our business capture process involves targeting select programs and working closely with the OE manufacturer platform engineering and purchasing teams. Bidding on OE automotive platforms typically encompasses many months of engineering and business development activity. Throughout the process, our sales team, program managers and product engineers assist the OE customer in defining the project's technical and

business requirements. A normal part of the process includes our engineering and sales personnel working on customers' integrated product teams, creating a statement of requirements, and assisting our customers with full system or component design and development concepts that deliver expectations and create value for OE manufacturer customers. Given that the Clean Air, Ride Performance and Powertrain operations typically involve long-term production contracts awarded on a platform-by-platform basis, our strategy is to leverage our engineering expertise and strong customer relationships to target and win new business and increase operating margins.

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For aftermarket sales and marketing, our sales force is generally organized by region and customer and covers multiple product lines. We sell aftermarket products through five primary channels of distribution: (1) traditional three-step distribution system of full-line warehouse distributors, jobbers and service providers; (2) two-step distribution system of warehouse distributors that distribute directly to the service providers; (3) direct sales to retailers; (4) direct sales to service provider chains and (5) direct sales through online channels. Our aftermarket sales and marketing representatives cover all levels of the distribution channel, stimulating interest in our products and helping our products move through the distribution system. Also, to generate demand for our products, we run print, online and outdoor advertisements and training conducted by our field sales force along with E-training courses. In addition, we maintain detailed web sites for certain of our brands.

Business Strategy

We are a leading diversified, global supplier of innovative products and services to light vehicle, commercial truck, off-highway, industrial and aftermarket customers. Our strategy focuses on addressing the evolving needs of our OE and aftermarket customers around the world to drive growth.

The key components of our business strategy are described below:

Continue to optimize our operations by aggressively pursuing cost competitiveness in all business segments and continuing to drive productivity in existing operations

As we continue to expand our distribution and service capabilities globally, we seek to continue optimizing our performance through enhanced efficiencies in order to meet the world-class delivery performance our customers increasingly require. We have made investments in our global distribution network, through our new multi-product distribution centers, and through the implementation of automated picking technology and a more efficient replenishment system with the objective of improving inventory visibility and availability and lowering costs.

We will continue to focus on operational excellence by optimizing our manufacturing footprint, further developing our engineering capabilities, managing the complexities of our global supply chain to realize purchasing economies of scale while satisfying diverse and global requirements, and supporting our businesses with robust information technology systems. We will make investments in our operations and infrastructure as required to achieve our strategic goals.

From a design perspective, we will bring a lean mindset to our portfolio to ensure standardization, remove redundancies, reduce transit costs, leverage economies of scale, and optimize manufacturing productivity. We will also continually look for ways to innovate and leverage cross- and up-sell opportunities to the market through a customer-centric product development process. From a manufacturing perspective, we will maintain a continuous improvement philosophy by streamlining plant operations and our network, and executing projects to improve efficiency.

Serving our customers also requires that we compete effectively at the unit cost level, in particular with OE customers. We are making concerted and systematic efforts to continuously improve our position on the cost curve for each of our component part categories. In doing so, we will continue to be a preferred supplier to our customers.

We will be mindful of the changing market conditions that might necessitate adjustments to our resources and manufacturing capacity around the world. We will also remain committed to protecting the environment as well as the health and safety of our employees.

Further execute on attaining synergies from the acquisition of Federal-Mogul

We completed the acquisition of Federal-Mogul on October 1, 2018. While we have undertaken significant integration subsequent to closing the Federal-Mogul acquisition, we continue to seek to optimize the combined operations. This optimization should present additional opportunities for cost reduction, increased profitability and cash flow.

Assess focused acquisition and investment opportunities that provide product line expansion, technological advancements, geographic positioning, penetration of emerging markets and market share growth

Throughout our history, we have successfully identified and capitalized on acquisitions, alliances and divestitures to achieve strategic growth and alignment. Through these transactions, we have (1) expanded our product portfolio with complementary technologies; (2) realized incremental business from existing customers; (3) gained access to new customers; (4) achieved leadership positions in geographic regions outside North America; and (5) re-focused on areas that will contribute to our profitable growth.

We intend to continue to explore strategic alliances, joint ventures, acquisitions and other transactions that complement, expand or enhance our existing products, technology, systems development efforts, customer base and/or global presence. We will align with companies that have proven products, proprietary technology, advanced research capabilities, broad geographic reach, and/or strong market positions to further strengthen our product leadership, technology position, global reach and customer relationships.

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Adapt cost structure to economic realities

We aggressively respond to difficult economic environments, aligning our operations to any resulting reductions in production levels and replacement demand and executing comprehensive restructuring and cost-reduction initiatives. Suppliers must continually identify and implement product innovation and cost reduction activities to fund customer annual price concession expectations in order to retain current business as well as to be competitively positioned for future new business opportunities.

Original Equipment Specific Strategies

The converging forces of connectivity, autonomy, electrification and shared mobility are spawning a new age of automotive autonomy and a unique opportunity to position our business for significant growth and profitability. We strive to strengthen our global position by designing, manufacturing, delivering and marketing technologically innovative products and systems for OE manufacturers.

The key components of our OE strategy are described below:

Maintain technological leadership to drive further growth from secular market trends

In order to maintain our strong market positions, we are focused on meeting changing performance requirements and keeping up with new OE trends such as mobility, electrification and autonomous driving. Aligning product lines and technical capabilities creates an ideal foundation to meet changing performance requirements for comfort and safety and again ultimately reinventing the ride of the future. In addition, our suite of solutions represents an opportunity to drive greater partnership with OE manufacturers, capturing growth with higher value content per vehicle.

OE manufacturers are responding to changing end customer trends and preferences alongside their own challenging cost structures by reducing design and production complexities and investing in advanced technologies that enable vehicle electrification and autonomy. We anticipate that OE suppliers with high technology capabilities in vehicle system integration will be able to enable a more seamless transition to next-generation electric vehicles and become preferred suppliers to OE manufacturers.

Penetrate adjacent market segments

We seek to penetrate a variety of adjacent sales opportunities and achieve growth in higher-margin businesses by applying our design, engineering and manufacturing capabilities. For example, we aggressively leverage our technology and engineering leadership in powertrain, clean air, ride performance and aftermarket into adjacent sales opportunities for heavy-duty trucks, buses, agricultural equipment, construction machinery and other vehicles in other regions around the world.

We design and launch clean air products for commercial vehicle customers such as Caterpillar, for whom we are their global diesel clean air system integrator, John Deere, Navistar, Deutz, Daimler Trucks, Scania, Weichai Power, FAW Group and Kubota. We also engineer and build modular NOx-reduction systems for large engines that meet standards of the International Maritime Organization, among others.

Our revenues generated by commercial truck, off-highway and industrial customers were 16% of our total revenues in 2018 and 12% in 2017.

Aftermarket Specific Strategies

We expect the demand for replacement parts to increase steadily as a result of the anticipated significant increase in VIO through 2040, the increase in the average age of VIO and the increase in the average miles driven per year. The characteristics of aftermarket sales and distribution are defined regionally, which require regionally focused strategies to address the key success factors of our customers.

The key components of our aftermarket strategy are described below:

Leverage the strength of our global aftermarket leading brands positions, product portfolio and range, marketing and selling expertise, and distribution and logistics capabilities

Our aftermarket business houses multiple leading brands with strong product offerings. We will build upon our brand strengths and grow our global aftermarket business by leveraging our broad product coverage and extensive distribution network. We intend to capitalize on aftermarket trends and expand in established markets (North America, Europe, Australia) as well as high-growth regions (China, South America, India, Southeast and Northeast Asia). Important focus areas are enhancing our presence in high-growth markets; leveraging our portfolio and strong presence in suspension to expand our business globally; and diversifying outside of chassis with our sealing, electronic and underhood products, as well as other components.

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Continue to strengthen our aftermarket capabilities and product offerings in mature markets, including North America and Europe

The scale of our aftermarket business allows for strong distribution channels that significantly enhance our go-to-market capabilities across mature markets in North America and Europe. We continually rationalize our already strong distribution networks with the goal of improved customer service at a lower cost. This is achieved by constantly sharing information across channels on best practices in go-to-market, manufacturing and distribution capabilities.

The North America and Europe go-to-market capabilities will be defined by positioning our distribution and installer partners for success. We believe this will require maintaining a vast catalog of products to provide the ability to address customer requirements quickly and easily. Managing vast and complex catalog of products requires an understanding of the composition of the car parc within the regions including wear patterns, typical replacement rates based on weather, road quality, and average miles driven annually. These compositions differ significantly by region, which will impact the range and frequency of replacement part requirements. The understanding of these regional dynamics will help us provide the right parts when they are needed and achieve the industry's best "Order to Delivery" times. We will continue to innovate product solutions that will be cost competitive, reliable, reduce install time, reduce the number of unique parts that installers need to inventory on-site, reduce the number of unique installer tools and equipment required, and improve installer safety.

In addition to having a comprehensive product catalog, we also strive to maintain very close relationships with our customers and help position them for success. We have launched a series of 'Tech First' initiatives to provide online, on demand, and onsite technical training and support to vehicle repair technicians who use and install our products in North America, Europe and China and plan to expand into South America. This initiative included Garage Gurus™, a network of technical support centers that provide some of the most comprehensive training programs in the industry that educate our partners and customers with emerging vehicle technologies and vehicle repair operational skills. We believe it is key to our strategy to provide aftermarket parts that are simple to install and to make sure our customers have the resources to know how to install these parts properly. In having the right products and resources for our customers, we believe we will continue to be a preferred aftermarket supplier and continue to drive growth in the Americas and emerging economic areas.

Increase aftermarket position in high-growth regions, notably in Asia Pacific

The Asia Pacific region, particularly the high-growth markets of China and India, presents a significant opportunity for us to expand our business. We have made investments in distribution and in our sales force in both China and the rest of Asia to help drive growth in this increasingly important region. We must take into account the different operational requirements in Asia Pacific in order to drive aftermarket growth in this region.

The Asia Pacific light vehicle and commercial vehicle aftermarket industry is fragmented with a large number of small distributors and installers that require different strategies and solutions than more mature consolidated markets. Distribution in smaller volumes will require us to have a hub and spoke warehousing approach to compete on the basis of optimal "Order to Delivery" timeliness while maintaining a broad range of products.

Additionally, buying online is the preferred purchase method for many smaller distribution and installer partners. The sophistication of the existing online marketplaces in Asia Pacific will require us to develop adaptive and flexible omnichannel tools in order to compete effectively. We believe that developing a competitive online platform for our Asia Pacific customers will be the foundation for us to build a digital platform that will improve our competitiveness globally.

Environmental Matters

For additional information regarding environmental matters, see Item 3, "Legal Proceedings," Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations — Environmental Matters" and Note 15—Commitments and Contingencies of the consolidated financial statements included in Item 8, "Financial Statements and Supplementary Data."

Employees

As of December 31, 2018, we had approximately 81,000 employees of whom approximately 48% were covered by collective bargaining agreements. With the exception of two facilities in the U.S., most of our unionized manufacturing facilities have their own contracts with their own expiration dates and, as a result, no contract expiration date affects more than one facility.

Other

We purchase various raw materials and component parts for use in our manufacturing processes, including ferrous and non-ferrous metals, non-metallic raw materials, stampings, castings and forgings. We also purchase parts manufactured by other manufacturers for sale in the aftermarket. The principal raw material that we use is steel. We obtain steel from a number of sources pursuant to various contractual and other arrangements. We believe that an adequate supply of steel can presently be obtained from a number of different domestic and foreign suppliers. We address price increases by evaluating alternative materials and processes, reviewing material substitution opportunities, increasing component sourcing and parts assembly in best

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cost countries, strategically pursuing regional and global purchasing strategies for specific commodities, and aggressively negotiating with our customers to allow us to recover these higher costs from them.

We hold a number of domestic and foreign patents and trademarks relating to our products and businesses. Through our acquisition of Federal-Mogul, we acquired in excess of 6,900 patents and more than 6,700 active trademark registrations and applications worldwide. We manufacture and distribute our aftermarket products under a number of brand names that are well-recognized in the marketplace and some of are registered trademarks. We also market certain of our clean air products to OE manufacturers under the names Solid SCR™ and XNOx®. The patents, trademarks and other intellectual property owned by or licensed to us are important in the manufacturing, marketing and distribution of our products. However, we do not materially rely on any single patent, nor will the expiration of any single patent materially affect our business. Our current patents expire over various periods into the year 2040. We are actively introducing and patenting new technology to replace formerly patented technology before the expiration of the existing patents. In the aggregate, our worldwide patent portfolio is materially important to our business because it enables us to achieve technological differentiation from our competitors.

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ITEM 1A.RISK FACTORS.

Future deterioration or prolonged difficulty in economic conditions could have a material adverse impact on our business, financial position and liquidity.

We are a global company and, as such, our businesses are affected by economic conditions in the various geographic regions in which we do business. Economic difficulties generally lead to tightening of credit and liquidity. These conditions often lead to low consumer confidence, which in turn results in delayed and reduced purchases of durable goods such as automobiles and other vehicles. As a result, during difficult economic times our OE customers can significantly reduce their production schedules. For example, light vehicle production declined significantly during the economic crisis in 2008 and 2009 in North America and Europe. More recently, light vehicle and commercial vehicle production has declined significantly in South America in 2015 and 2016 and persistent challenges in the Chinese economy in 2018 and continuing into 2019 may result in lower-than-anticipated growth in both light and commercial vehicles in the region. Additionally, production of off-highway equipment with our content on them have been weak in certain product applications, such as agricultural and construction equipment in North America and Europe. Any deterioration or prolonged difficulty in economic conditions in any region in which we do business could have a material adverse effect on our business, financial position and liquidity.

In addition, economic difficulties often lead to disruptions in the financial markets, which may adversely impact the availability and cost of credit which could materially and negatively affect our company. Future disruptions in the capital and credit markets could adversely affect our customers' and our ability to access the liquidity that is necessary to fund operations on terms that are acceptable to us or at all.

In addition, financial or other difficulties at any of our major customers could have a material adverse impact on us, including as a result of lost revenues, significant write downs of accounts receivable, significant impairment charges or additional restructuring beyond our current global plans. Severe financial or other difficulties at any of our major suppliers could have a material adverse effect on us if we are unable to obtain on a timely basis on similar economic terms the quantity and quality of components we require to produce our products.

Moreover, severe financial or operating difficulties at any light vehicle or commercial vehicle manufacturer or other supplier could have a significant disruptive effect on the entire industry, leading to supply chain disruptions and labor unrest, among other things. These disruptions could force original equipment manufacturers and, in turn, other suppliers, including us, to shut down production at plants. While the issues that our customers and suppliers face during economic difficulties may be primarily financial in nature, other difficulties, such as an inability to meet increased demand as conditions recover, could also result in supply chain and other disruptions.

Factors that reduce demand for our products or reduce prices could materially and adversely impact our financial condition and results of operations.

Demand for and pricing of our products are subject to economic conditions and other factors present in the various domestic and international markets where our products are sold. Demand for our OE products is subject to the level of consumer demand for new vehicles that are equipped with our parts. The level of new light vehicle, commercial truck and off-highway vehicle purchases is cyclical, affected by such factors as general economic conditions, interest rates and availability of credit, consumer confidence, patterns of consumer spending, industrial construction levels, fuel costs, government incentives and vehicle replacement cycles. Consumer preferences and government regulations also impact the demand for new light vehicle purchases equipped with our products. For example, if consumers increasingly prefer electric vehicles, demand for the vehicles equipped with our clean air products would decrease. Demand for our aftermarket, or replacement, products varies based upon such factors as general economic conditions; the level of new vehicle purchases, which initially displaces demand for aftermarket products; the severity of winter weather, which increases the demand for certain aftermarket products; the number of vehicles in operation; and other factors, including the average useful life of parts and number of miles driven.

The highly cyclical nature of the automotive and commercial vehicle industry presents a risk that is outside our control and that cannot be accurately predicted. Decreases in demand for automobiles and commercial vehicles and vehicle parts generally, or in the demand for our products in particular, could materially and adversely impact our

financial condition and results of operations.

In addition, we believe that increasingly stringent environmental standards for emissions have presented and will continue to present an important opportunity for us to grow our clean air product line. We cannot assure you, however, that environmental standards for emissions will continue to become more stringent or that the adoption of any new standards will not be delayed beyond our expectations.

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We are dependent on certain large customers for future revenue. The loss of all or a substantial portion of our revenues from any of these customers or the loss of market share by these customers could have a material adverse impact on us.

We depend on major vehicle manufacturers for a substantial portion of our revenues. For example, during the fiscal year ended December 31, 2018, General Motors and Ford accounted for 12% and 12% of our net sales, respectively. Following the Federal-Mogul acquisition, we are increasingly dependent on certain major aftermarket customers for our revenues. The loss of all or a substantial portion of our revenues from any of our large-volume customers could have a material adverse effect on our financial condition and results of operations by reducing cash flows and our ability to spread costs over a larger revenue base. We may experience decreased revenues from these customers for a variety of reasons, including but not limited to: (i) in the case of our OE customers, loss of awarded platforms, reduced demand for our customers' products, and work stoppages or other disruptions impacting OE production, and (ii) in the case of our aftermarket customers, reduced or delayed consumer requirements and competition from other brands or lower-cost alternatives. Further, our aftermarket customers are generally able to change suppliers more quickly than OE customers, which exacerbates these risks with respect to our aftermarket business. For all of our customers, we face the risk of their failure to pay us for a variety of reasons, including their respective financial conditions.

In addition, our customers compete intensively against each other. The loss of market share by any of our major customers could have a material adverse effect on our business unless we are able to achieve increased sales to other major customers.

We are subject to, and could be further subject to, government investigations or actions by other third parties.

We are subject to a variety of laws and regulations that govern our business both in the United States and internationally, including antitrust laws, violations of which can involve civil or criminal sanctions. Responding to governmental investigations or other actions may be both time-consuming and disruptive to our operations and could divert the attention of our management and key personnel from our business operations.

For example, antitrust authorities in various jurisdictions are investigating possible violations of antitrust laws by multiple automotive parts suppliers, including Tenneco. In addition, Tenneco and certain of its competitors are currently subject to civil putative class action lawsuits in the United States, which allege anti-competitive conduct related to the activities subject to these investigations. More related lawsuits may be filed, including in other jurisdictions.

While we have established a reserve that we believe is adequate to resolve Tenneco's antitrust matters globally, we cannot, however, assure you that the reserve will not change materially from time to time or that the costs, charges and liabilities associated with these matters will not exceed any amounts reserved for them in our consolidated financial statements.

We may be unable to realize sales represented by our awarded business, which could materially and adversely impact our financial condition and results of operations.

The realization of future sales from awarded business is inherently subject to a number of important risks and uncertainties, including the number of vehicles that our OE customers will actually produce, the timing of that production and the mix of options that our OE customers and consumers may choose. For example, light vehicle production declined significantly during the economic crisis in 2008 and 2009 in North America and Europe. More recently, light vehicle and commercial truck production has declined significantly in South America in 2015 and 2016 and persistent challenges in the Chinese economy in 2018 and going into 2019 may result in lower-than-anticipated growth in both light and commercial vehicles in the region. In addition to the risks inherent in the cyclicality of vehicle production, our customers generally have the right to replace us with another supplier at any time for a variety of reasons and have demanded price decreases over the life of awarded business. Accordingly, we cannot assure you that we will in fact realize any or all of the future sales represented by our awarded business. Any failure to realize these sales could have a material adverse effect on our financial condition, results of operations, and liquidity.

In many cases, we must commit substantial resources in preparation for production under awarded OE business well in advance of the customer's production start date. In certain instances, the terms of our OE customer arrangements permit us to recover these pre-production costs if the customer cancels the business through no fault of our company. Although we have been successful in recovering these costs under appropriate circumstances in the past, we can give no assurance that our results of operations will not be materially impacted in the future if we are unable to recover these types of pre-production costs in the event of an OE customer's cancellation of awarded business.

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Our level of debt, which increased in amount and percentage of floating rate debt as a result of the Acquisition, makes us more sensitive to the effects of economic downturns; and provisions in our debt agreements could constrain our ability to react to changes in the economy or our industry.

Our leverage increased as a result of the Acquisition. As of December 31, 2018, we had approximately $3.3 billion of indebtedness outstanding under our new senior credit facility, $2.0 billion of outstanding notes and approximately $100 million of other debt. In addition, as a result of the Acquisition we have increased exposure to interest rate fluctuations because our percentage of floating rate debt increased.

Our level of debt makes us more vulnerable to changes in our results of operations because a significant portion of our cash flow from operations is dedicated to servicing our debt and is not available for other purposes and our level of debt could impair our ability to raise additional capital if necessary. Further increases in interest rates will increase the amount of cash required for debt service. Under the terms of our existing senior secured credit facility, the indentures governing our notes and the agreements governing our other indebtedness, we are able to incur significant additional indebtedness in the future. The more we become leveraged, the more we, and in turn our security holders, become exposed to many of the risks described herein.

Our ability to make payments on our indebtedness depends on our ability to generate cash in the future. If we do not generate sufficient cash flow to meet our debt service, capital investment and working capital requirements, we may need to reduce or cease our repurchase of shares or payments of dividends, seek additional financing or sell assets. If we require such financing and are unable to obtain it, we could be forced to sell assets under unfavorable circumstances and we may not be able to sell assets quickly enough or for sufficient amounts to enable us to meet our obligations.

In addition, our senior credit facility and our other debt agreements contain covenants that limit our flexibility in planning for or reacting to changes in our business and our industry, including limitations on our ability to:

- declare dividends or redeem or repurchase capital stock;
- prepay, redeem or purchase other debt;
- incur liens;
- make loans, guarantees, acquisitions and investments;
- incur additional indebtedness;
- amend or otherwise alter debt and other material agreements;
- engage in mergers, acquisitions or asset sales; and
- engage in transactions with affiliates.

Our failure to comply with the covenants contained in our debt instruments, including as a result of events beyond our control, could result in an event of default, which could materially and adversely affect our operating results and our financial condition.

Our senior credit facility and other agreements governing financings we enter into from time to time require us to maintain certain financial ratios. Our senior credit facility and our other financing instruments require us to comply with various operational and other covenants. If there were an event of default under any of our financing instruments that was not cured or waived, the holders of the defaulted financing could cause all amounts outstanding with respect to that financing to be due and payable immediately (which, in turn, could also result in an event of default under one or more of our other financing arrangements). If such event occurs, the lenders under our senior credit facility could elect to terminate their commitments, cease making further loans and institute foreclosure proceedings against our assets and we could lose access to our factoring and supply chain financing programs. We cannot assure you that our assets or cash flow would be sufficient to fully repay borrowings under our outstanding financing instruments, either upon maturity or if accelerated, upon an event of default, or that we would be able to refinance or restructure the payments on those financing instruments. This would have a material adverse impact on our liquidity, financial position and results of operations, and on our ability to effect our share repurchase and dividend programs. For example, as a result of the economic downturn in 2008 and 2009, we needed to amend our senior credit agreement to revise the financial ratios we were required to maintain. Even though we were able to obtain that amendment, we

cannot assure you that we would be able to obtain an amendment on commercially reasonable terms, or at all, if required in the future.

Our working capital requirements may negatively affect our liquidity and capital resources.

Our working capital requirements can vary significantly, depending in part on the level, variability and timing of our customers' worldwide vehicle production and the payment terms with our customers and suppliers. If our working capital needs exceed our cash flows from operations, we would look to our cash balances and availability for borrowings under our borrowing

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arrangements to satisfy those needs, as well as potential sources of additional capital, which may not be available on satisfactory terms and in adequate amounts, if at all.

We may be unable to realize the expected benefits of our initiatives to improve operating performance and generate cost savings and improvements.

We regularly implement strategic and other initiatives designed to improve our operating performance. Our inability to implement these initiatives in accordance with our plans or our failure to achieve the goals of these initiatives could have a material adverse effect on our business. We rely on these initiatives to offset pricing pressures from our suppliers and our customers, as described above, as well as to manage the impacts of production cuts. Our implementation of announced initiatives is from time to time subject to legal challenge in certain non-U.S. jurisdictions (where applicable employment laws differ from those in the United States). Furthermore, the terms of our senior credit facility and the indentures governing our notes may restrict the types of initiatives we undertake. In the past we have been successful in obtaining the consent of our senior lenders where appropriate in connection with our initiatives. We cannot assure you, however, that we will be able to pursue, successfully implement or realize the expected benefits of any initiative or that we will be able to sustain improvements made to date.

Exchange rate fluctuations could cause a decline in our financial condition and results of operations.

As a result of our international operations, we are subject to increased risk because we generate a significant portion of our net sales and incur a significant portion of our expenses in currencies other than the U.S. dollar. For example, where we have a greater portion of costs than revenues generated in a foreign currency, we are subject to risk if the foreign currency in which our costs are paid appreciates against the currency in which we generate revenue because the appreciation effectively increases our cost in that country.

The financial condition and results of operations of some of our operating entities are reported in foreign currencies and then translated into U.S. dollars at the applicable exchange rate for inclusion in our consolidated financial statements. As a result, appreciation of the U.S. dollar against these foreign currencies generally will have a negative impact on our reported revenues and operating profit while depreciation of the U.S. dollar against these foreign currencies will generally have a positive effect on reported revenues and operating profit.

We do not generally seek to mitigate the impact of currency through the use of derivative financial instruments. To the extent we are unable to match revenues received in foreign currencies with costs paid in the same currency, exchange rate fluctuations in that currency could have a material adverse effect on our business.

The hourly workforce in the industry in which we participate is highly unionized and our business could be adversely affected by labor disruptions.

A portion of our hourly workforce in North America and the majority of our hourly workforce in other regions are unionized. Although we consider our current relations with our employees to be satisfactory, if major work disruptions were to occur, our business could be adversely affected by, for instance, a loss of revenues, increased costs or reduced profitability. We have not experienced a material labor disruption in our recent history, but there can be no assurance that we will not experience a material labor disruption at one of our facilities in the future in the course of renegotiation of our labor arrangements or otherwise.

In addition, substantially all of the hourly employees of General Motors, Ford and Fiat Chrysler Automobiles in North America and many of their other suppliers are represented by the United Automobile, Aerospace and Agricultural Implement Workers of America under collective bargaining agreements. Vehicle manufacturers, their suppliers and their respective employees in other countries are also subject to labor agreements. A work stoppage or strike at one of our production facilities, at those of a customer, or impacting a supplier of ours or any of our customers, could have an adverse impact on us by disrupting demand for our products and/or our ability to manufacture our products.

From time to time we experience significant increases and fluctuations in raw materials pricing and increases in certain lead times; and future changes in the prices of raw materials or utility services, or future increases in lead times, could have a material adverse impact on us.

Significant increases in the cost of certain raw materials used in our products, mainly steel, oil and rubber, or the cost of utility services required to produce our products, to the extent they are not timely reflected in the price we charge our customers or are otherwise mitigated, could materially and adversely impact our results. For example, in March 2018, the current U.S. administration imposed a 25% tariff on steel imports and a 10% tariff on aluminum imports and throughout 2018, and announced additional tariffs on goods imported from China specifically, as well as certain other countries. In addition, during 2017, carbon steel prices as well as raw material prices (such as ferrochrome, iron ore, scrap and coking coal) to produce carbon steel remained at high levels after the sharp increases in 2016. In addition, both the European Union as well as the

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United States continue to impose a variety of anti-dumping duties on carbon steel as well as stainless steel. This not only results in higher domestic pricing but limits opportunities in terms of off shore buying. Carbon steel prices in North America increased further in the fourth quarter of 2017 in the run-up to the mandated "232 Section Investigations" against the import deadline of mid January 2018.

We attempt to mitigate price increases by evaluating alternative materials and processes, reviewing material substitution opportunities, increasing component sourcing and parts assembly in best cost countries, and strategically pursuing regional and global purchasing strategies for specific commodities. We also aggressively negotiate to recover these higher costs from our customers, and in some cases, such as with respect to steel surcharges, we have the contractual right to recover some or all of these higher costs from certain of our customers. However, if we are successful in recovering these higher costs, we may not receive that recovery in the same period that the costs were incurred and the benefit of the recovery may not be evenly distributed throughout the year.

We also continue to pursue productivity initiatives and other opportunities to reduce costs through restructuring activities. During periods of economic recovery, the cost of raw materials and utility services generally rise. Accordingly, we cannot ensure that we will not face further increased prices in the future or, if we do, whether our actions will be effective in containing them.

By entering into new product lines and employing new technologies, our ability to produce certain of these products may be constrained due to longer lead times for our facilities, as well as those of our suppliers. We attempt to mitigate the negative effects of these longer lead times by improving the accuracy of our long term planning; however, we cannot provide any certainty that we will always be successful in avoiding disruptions to our delivery schedules.

We may incur costs related to product warranties, environmental and regulatory matters, legal proceedings and other claims, which could have a material adverse impact on our financial condition and results of operations.

From time to time, we receive product warranty claims from our customers, pursuant to which we may be required to bear costs of repair or replacement of certain of our products. Vehicle manufacturers require their outside suppliers to guarantee or warrant their products and to be responsible for the operation of these component products in new vehicles sold to consumers. Warranty claims may range from individual customer claims to full recalls of all products in the field. We cannot assure you that costs associated with providing product warranties will not be material, or that those costs will not exceed any amounts reserved in our consolidated financial statements. For a description of our accounting policies regarding warranty reserves, see “Management’s Discussion and Analysis of Financial Condition and Results of Operations — Critical Accounting Policies” included in Item 7.

Our global operations subject us to extensive governmental regulations worldwide. Foreign, federal, state and local laws and regulations may change from time to time and our compliance with new or amended laws and regulations in the future may materially increase our costs and could adversely affect our results of operations and competitive position. For example, we are subject to a variety of environmental and pollution control laws and regulations in all jurisdictions in which we operate. Soil and groundwater remediation activities are being conducted at certain of our current and former real properties. We record liabilities for these activities when environmental assessments indicate that the remedial efforts are probable and the costs can be reasonably estimated. On this basis, we have established reserves that we believe are adequate for the remediation activities at our current and former real properties for which we could be held responsible. Although we believe our estimates of remediation costs are reasonable and are based on the latest available information, the cleanup costs are estimates and are subject to revision as more information becomes available about the extent of remediation required. In future periods, we could incur cash costs or charges to earnings if we are required to undertake remediation efforts as the result of ongoing analysis of the environmental status of our properties. In addition, violations of the laws and regulations we are subject to could result in civil and criminal fines, penalties and sanctions against us, our officers or our employees, as well as prohibitions on the conduct of our business, and could also materially affect our reputation, business and results of operations.

We also from time to time are involved in a variety of legal proceedings, claims or investigations. These matters typically are incidental to the conduct of our business. Some of these matters involve allegations of damages against us relating to environmental liabilities, intellectual property matters, personal injury claims, taxes, employment

matters or commercial or contractual disputes or allegations relating to legal compliance by us or our employees. For example, we are subject to a number of lawsuits initiated by a significant number of claimants alleging health problems as a result of exposure to asbestos. Many of these cases involve significant numbers of individual claimants. Many of these cases also involve numerous defendants, with the number of defendants in some cases exceeding 100 defendants from a variety of industries. As major asbestos manufacturers or other companies that used asbestos in their manufacturing processes continue to go out of business, we may experience an increased number of these claims.

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We vigorously defend ourselves in connection with all of the matters described above. We cannot, however, assure you that the costs, charges and liabilities associated with these matters will not be material, or that those costs, charges and liabilities will not exceed any amounts reserved for them in our consolidated financial statements. In future periods, we could be subject to cash costs or charges to earnings if any of these matters are resolved unfavorably to us. See "Management's Discussion and Analysis of Financial Condition and Results of Operations — Environmental and Legal Contingencies" included in Item 7.

Developments relating to our intellectual property could materially impact our business.

We and others in our industry hold a number of patents and other intellectual property rights, including licenses, which are critical to our respective businesses and competitive positions. Notwithstanding our intellectual property portfolio, our competitors may develop similar or superior proprietary technologies. Further, as we expand into regions where the protection of intellectual property rights is less robust, the risk of others replicating our proprietary technologies increases, which could result in a deterioration of our competitive position. On occasion, we may assert claims against third parties who are taking actions that we believe are infringing on our intellectual property rights. Similarly, third parties may assert claims against us and our customers and distributors alleging our products infringe upon third party intellectual property rights. These claims, regardless of their merit or resolution, are frequently costly to prosecute, defend or settle and divert the efforts and attention of our management and employees. Claims of this sort also could harm our relationships with our customers and might deter future customers from doing business with us. If any such claim were to result in an adverse outcome, we could be required to take actions which may include: expending significant resources to develop or license non-infringing products; paying substantial damages to third parties, including to customers to compensate them for their discontinued use or replacing infringing technology with non-infringing technology; or cessation of the manufacture, use or sale of the infringing products. Any of the foregoing results could have a material adverse effect on our business, financial condition, results of operations or our competitive position.

We are increasingly dependent on information technology, and if we are unable to protect against service interruptions or security breaches, our business could be adversely affected.

Our operations rely on a number of information technologies to manage, store, and support business activities. Some of these technologies are managed by third-party service providers and are not under our direct control. We have put in place a number of systems, processes, and practices designed to protect against the failure of our systems, as well as the misappropriation, exposure or corruption of the information stored thereon. Unintentional service disruptions or intentional actions such as intellectual property theft, cyber-attacks, unauthorized access or malicious software, may lead to such misappropriation, exposure or corruption if our, or our service providers', protective measures prove to be inadequate. Further, these events may cause operational impediments or otherwise adversely affect our product sales, financial condition and/or results of operations. We could also encounter violations of applicable law or reputational damage from the disclosure of confidential information belonging to us or our employees, customers or suppliers. In addition, the disclosure of non-public information could lead to the loss of our intellectual property and/or diminished competitive advantages. Should any of the foregoing events occur, we may be required to incur significant costs to protect against damage caused by these disruptions or security breaches in the future. In addition, evolving and expanding compliance and operational requirements under the privacy laws of the jurisdictions in which we operate, such as the EU General Data Protection Regulation, or GDPR, which took effect in May 2018, impose significant costs that are likely to increase over time.

We may have difficulty competing favorably in the highly competitive light vehicle and commercial vehicle supplier industry.

The light vehicle and commercial vehicle supplier automotive parts industry is highly competitive. Although the overall number of competitors has decreased due to ongoing industry consolidation, we face significant competition within each of our major product areas, including from new competitors entering the markets which we serve. The principal competitive factors include price, quality, service, product performance, design and engineering capabilities, new product innovation, global presence and timely delivery. As a result, many suppliers have established or are

establishing themselves in emerging, low-cost markets to reduce their costs of production and be more conveniently located for customers. Although we are also pursuing a best-cost country production strategy and otherwise continue to seek process improvements to reduce costs, we cannot assure you that we will be able to continue to compete favorably in this competitive market or that increased competition will not have a material adverse effect on our business by reducing our ability to increase or maintain sales or profit margins.

In addition, our competitors may foresee the course of market development more accurately than we do, develop products that are superior to ours, adapt more quickly than we do to new technologies or evolving customer requirements or develop or introduce new products or solutions before we do, particularly in respect of potential transformative technologies such as autonomous driving solutions. As a result, our products may not be able to compete successfully with their products. These trends may adversely affect our sales as well as the profit margins on our products. Failure to innovate and to develop or acquire new and compelling products that capitalize on new technologies could have a material adverse impact on our results of operations.

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Furthermore, due to the cost focus of our major OE customers, we have been, and expect to continue to be, requested to reduce prices as part of our initial business quotations and over the life of OE vehicle platforms we have been awarded. We cannot be certain that we will be able to generate cost savings and operational improvements in the future that are sufficient to offset price reductions requested by existing OE customers and necessary to win additional business. OE customers also direct us into suppliers for component purchases not allowing us to leverage our own supply base and realize cost reductions on this directed spend.

The decreasing number of customers and suppliers in our industry could make it more difficult for us to compete favorably.

Our financial condition and results of operations could be adversely affected because the customer base for our parts and services is decreasing in both the OE market and aftermarket. As a result, we are competing for business from fewer customers. Furthermore, consolidation among suppliers have resulted in fewer, larger suppliers who benefit from purchasing and distribution economies of scale. If we cannot achieve cost savings and operational improvements sufficient to allow us to compete favorably in the future with these larger companies, our financial condition and results of operations could be adversely affected due to a reduction of, or inability to increase, sales.

Our aftermarket sales may be negatively impacted by increasing competition from lower cost, private-label products.

Distribution channels in the aftermarket have continued to consolidate and, as a result, our sales to large retail customers represent a significant portion of our aftermarket business. Private-label aftermarket products, which are typically manufactured at a lower cost, often containing little or no premium technology, and are branded with a store or other private-label brand, are increasingly available to these large retail customers. Our aftermarket business is facing increasing competition from these lower cost, private-label products and there is growing pressure to expand our entry-level product lines so that retailers may offer a greater range of price points to their consumer customers. We cannot assure you that we will be able to maintain or increase our aftermarket sales to these large retail customers or that increased competition from these lower cost, private-label aftermarket products will not have an adverse impact on our aftermarket business.

If the reputation of one or more of our leading brands is harmed, aftermarket sales may be negatively impacted.

Our aftermarket sales are dependent on the reputation and success of our brands, including Monroe®, Champion®, Öhlins®, MOOG®, Walker®, Fel-Pro®, Wagner®, Ferodo®, Rancho®, Thrush®, National®, Sealed Power® and others. Product liability claims or recalls could result in negative publicity that could harm the reputation of our brands. If one or more of our leading brands suffers damage to its reputation due to real or perceived quality or safety issues, our financial results could be adversely affected.

Improvements in automotive parts are adversely affecting aftermarket demand for some of our products.

The average useful life of automotive parts has steadily increased in recent years due to innovations in products and technologies. The longer product lives allow vehicle owners to replace parts of their vehicles less often. As a result, a portion of sales in the aftermarket has been displaced. In addition, advancements in technology may lead to enhancements in aftermarket product performance that render our product obsolete. This has adversely impacted, and could continue to adversely impact, our aftermarket sales. Also, any additional increases in the average useful lives of automotive parts or other enhancements in aftermarket performance would further adversely affect the demand for our aftermarket products.

If we do not respond appropriately, the evolution towards autonomous vehicles and car and ride sharing could adversely affect our business.

The light vehicle industry is increasingly focused on the development of advanced driver assistance technologies, with the goal of developing and introducing a commercially viable, fully automated driving experience. There has also been an increase in consumer preferences for car and ride sharing, as opposed to automobile ownership, which may result in a long-term reduction in the number of vehicles per capita. These evolving areas have also attracted increased competition from entrants outside the traditional light vehicle industry. Failure to innovate and to develop or acquire new and compelling products that capitalize upon new technologies in response to OE and consumer preferences could have a material adverse impact on our results of operations.

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We may not be able to respond quickly enough to changes in technology and to develop our intellectual property into commercially viable products.

Changes in competitive technologies may render certain of our products obsolete or less attractive. Our ability to anticipate changes in technology and to successfully develop and introduce new and enhanced products on a timely basis are significant factors in our ability to remain competitive and to maintain or increase our revenues.

We cannot provide assurance that certain of our products will not become obsolete or that we will be able to achieve the technological advances that may be necessary for us to remain competitive and maintain or increase our revenues in the future. We are also subject to the risks generally associated with new product introductions and applications, including lack of market acceptance, delays in product development or production, and failure of products to operate properly. If we are unable to react to changes in the marketplace, including the potential introduction of technologies such as autonomous driving solutions, our financial performance could be adversely affected.

Any acquisitions we make could disrupt our business and seriously harm our financial condition.

We may, from time to time, consider acquisitions of complementary companies, products or technologies. Acquisitions involve numerous risks, including difficulties in the assimilation of the acquired businesses, the diversion of our management's attention from other business concerns and potential adverse effects on existing business relationships with customers and suppliers. In addition, any acquisitions could involve the incurrence of substantial additional indebtedness. We cannot assure you that we will be able to successfully integrate any acquisitions that we pursue or that such acquisitions, and the potential related synergies, will perform as planned or prove to be beneficial to our operations and cash flow, or deliver any anticipated strategic benefits. Any such failure could seriously harm our business, financial condition and results of operations.

Certain of our operations are conducted through joint ventures, which have unique risks.

Certain of our operations are conducted through joint ventures. Our joint ventures are governed by mutually established agreements that we entered into with our partners, and, as such, we do not unilaterally control the joint ventures. There is a risk that our partners' objectives for the joint ventures may not be aligned with ours, leading to potential disagreements over management of the joint ventures. At some of our joint ventures, our joint venture partner is also affiliated with the largest customer of the joint venture, which may create a conflict between the interests of our partner and the joint venture. Also, our ability to sell our interest in a joint venture may be subject to contractual and other limitations.

Additional risks associated with joint ventures include our partners failing to satisfy contractual obligations, conflicts arising between us and any of our partners, a change in the ownership of any of our partners and our limited ability to control compliance with applicable rules and regulations. Accordingly, any such occurrences could adversely affect our financial condition, operating results and cash flows.

We are subject to risks related to operating a multi-national company.

We have manufacturing and distribution facilities in many regions across six continents. For the fiscal year ended December 31, 2018, a significant portion of our net sales were derived from operations outside North America. Current events including tax reform proposals and the possibility of renegotiated trade deals and international tax law treaties, create a level of uncertainty, and potentially increased complexity, for multi-national companies. These uncertainties could have a material adverse effect on our business and our results of operations and financial condition. In addition, international operations are subject to various risks which could have a material adverse effect on those operations or our business as a whole, including:

- currency exchange rate fluctuations;
- exposure to local economic conditions and labor issues;
- exposure to local political conditions, including the risk of seizure of assets by a foreign government;
- exposure to local social conditions, including corruption and any acts of war, terrorism or similar events;
- exposure to local public health issues and the resultant impact on economic and political conditions;
- inflation in certain countries;
-

limitations on the repatriation of cash, including imposition or increase of withholding and other taxes on remittances and other payments by foreign subsidiaries;
- retaliatory tariffs and restrictions limiting free movement of goods and an unfavorable trade environment, including as a result of political conditions and changes in the laws in the United States and elsewhere and as described in more details below;
- the impact of uncertainties surrounding the implementation of Brexit; and
- requirements for manufacturers to use locally produced goods.

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Entering new markets poses new competitive threats and commercial risks.
As we have expanded into markets beyond light vehicles, we expect to diversify our product sales by leveraging technologies being developed for the light vehicle segment. Such diversification requires investments and resources which may not be available as needed. We cannot guarantee that we will be successful in leveraging our capabilities into new markets and thus, in meeting the needs of these new customers and competing favorably in these new markets. Further, a significant portion of our growth potential is dependent on our ability to increase sales to commercial truck and off-highway vehicle customers. While we believe that we can achieve our growth targets with the production contracts that have been or will be awarded to us, our future prospects will be negatively affected if those customers underlying these contracts experience reduced demand for their products, or financial difficulties.

We have recorded a significant amount of long lived assets, goodwill, and other intangible assets, which may become impaired in the future and negatively affect our operating results.
We have recorded a significant amount of long lived assets, goodwill, and other identifiable intangibles assets, including customer relationships, trademarks and brand names, and developed technologies due to the acquisition of Federal-Mogul. Long lived assets, goodwill, and other identifiable intangible assets were approximately $4,078 million as of December 31, 2018, or 30% of our total assets. Under generally accepted accounting principles in the United States, long-lived assets, excluding goodwill and indefinite lived intangible assets, are required to be evaluated for impairment whenever adverse events or changes in circumstances indicate a possible impairment. If business conditions or other factors cause profitability and cash flows to decline, we may be required to record non-cash impairment charges. Goodwill and indefinite lived intangible assets must be evaluated for impairment annually or more frequently if events indicate it is warranted. Impairment of goodwill and other identifiable intangible assets may result from, among other things, deterioration in our performance, adverse market conditions, adverse changes in applicable laws or regulations, including changes that restrict the activities of or affect the products sold by our business, and a variety of other factors. The amount of any quantified impairment must be expensed immediately and subjects us to financial statement risk in the event that long lived assets, goodwill or other identifiable intangible assets become impaired.
The value of our deferred tax assets may not be realized, which could materially and adversely affect our operating results.
As of December 31, 2018, we had approximately $379 million in net deferred tax assets. These deferred tax assets include net operating loss carryovers and tax credits that can be used to offset taxable income in future periods and reduce income taxes payable in those future periods. Each quarter, we determine the probability of the realization of deferred tax assets, using significant judgments and estimates with respect to, among other things, historical operating results and expectations of future earnings and tax planning strategies. If we determine in the future that there is not sufficient positive evidence to support the valuation of these assets, due to the risk factors described herein or other factors, we may be required to further adjust the valuation allowance to reduce our deferred tax assets. Such a reduction could result in material non-cash expenses in the period in which the valuation allowance is adjusted and could have a material adverse effect on our results of operations.
Our expected annual effective tax rate could be volatile and materially change as a result of changes in mix of earnings and other factors.
Our overall effective tax rate is equal to our total tax expense as a percentage of our total profit or loss before tax. However, tax expenses and benefits are determined separately for each tax paying entity or group of entities that is consolidated for tax purposes in each jurisdiction. Losses in certain jurisdictions may provide no current financial statement tax benefit. As a result, changes in the mix of profits and losses between jurisdictions, among other factors, could have a significant impact on our overall effective tax rate.
Changes in tax law or trade agreements and new or changed tariffs could have a material adverse effect on us.
Changes in U.S. political, regulatory and economic conditions and/or changes in laws and policies governing U.S. tax laws, foreign trade (including trade agreements and tariffs), manufacturing, and development and investment in the

territories and countries where we and/or our customers operate could adversely affect our operating results and business.

For example, on December 22, 2017, the U.S. President signed into law new legislation that significantly revises the U.S. Internal Revenue Code. The newly enacted federal income tax law, among other things, contains significant changes to corporate taxation, including the reduction of the corporate income tax rate from a top marginal rate of 35% to a flat rate of 21%, a one-time transition tax on offshore earnings at reduced tax rates regardless of whether the earnings are repatriated, elimination of U.S. tax on foreign dividends (subject to certain important exceptions), new taxes on certain foreign earnings, a new minimum tax related to payments to foreign subsidiaries and affiliates, immediate deductions for certain new investments as opposed to deductions for depreciation expense over time, and the modification or repeal of many business deductions and credits.

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In addition, the United States, Mexico and Canada have renegotiated the North American Free Trade Agreement ("NAFTA"). The revised agreement, the US-Mexico-Canada Agreement ("USMCA"), contains new and revised provisions that alter the prior rules governing when imports and exports of autos and auto parts are eligible for duty-free treatment. Generally these new rules require a higher percentage of the overall content of the auto or autopart to originate in one of the USMCA's countries (the U.S., Mexico or Canada). The U.S. Congress must approve the USMCA provisions before they can become effective. Our manufacturing facilities in the U.S., Mexico and Canada are dependent on duty-free trade within the USMCA region. We have significant movement of goods within NAFTA region, and the imposition of customs duties on imports could negatively impact our financial performance. Moreover, in March 2018, the U.S. government imposed a 25% ad valorem tariff on certain steel imports and a 10% ad valorem tariff on certain aluminum imports. There was a short exemption period from the steel and aluminum tariffs for Canada, Mexico and the European Union, which ended on June 1, 2018. As a result of the tariffs, countries such as, Canada, China and Mexico have implemented retaliatory actions with respect to U.S. imports into their countries, which could adversely affect our business, financial condition or results of operations.

In addition, on three separate occasions in 2018, the U.S. government imposed additional tariffs on products from China. Specifically, on July 6, 2018, an additional 25% ad valorem tariff was imposed on certain imports from China. On August 23, 2018, an additional group of Chinese imports were assessed an additional 25% ad valorem tariff, and finally on September 24, 2018, a third group of Chinese imports were assessed an additional 10% ad valorem tariff (set to increase to 25% on March 2, 2019, if no resolution is reached with China by that date). The Administration has signaled that additional Chinese products may be targeted with additional tariffs. China has retaliated with tariffs on certain U.S. imports.

The imposition of the steel and aluminum tariffs, or any future imposition of tariffs or duties, is expected to have a pervasive impact on the metals market in which we operate and could result in a decrease in imports and higher prices for those imports which are sold into the U.S. When we buy metals internationally, we may be unable to pass through the higher costs to our customers, which could adversely impact our financial condition and operating results. In addition, a decrease in imports could cause a disruption or shortage in the availability of the raw materials that we buy, which could limit our ability to meet customer demand or purchase material at competitive prices. This could cause the Company to lose sales, incur additional costs, or suffer harm to our reputation, all of which may adversely affect operating results.

Further, in May 2018, the U.S. government announced that it is considering potential additional tariffs to be imposed on imported automobiles and automotive parts. Certain aspects of our business depend on the importation of automotive parts from outside of the U.S. If these or other similar tariffs are imposed, our business and results of operations could be materially adversely affected.

The Company's pension obligations and other postretirement benefits assumed as a result of the Acquisition could adversely affect the Company’s operating margins and cash flows.

Following completion of the Acquisition, pension and other postretirement benefit obligations have increased. The automotive industry, like other industries, continues to be affected by the rising cost of providing pension and other postretirement benefits. In addition, the Company sponsors certain defined benefit plans worldwide that are underfunded and will require cash payments. If the performance of the assets in the pension plans does not meet the Company’s expectations, or other actuarial assumptions are modified, the Company’s required contributions may be higher than it expects.

The Company’s hedging activities to address commodity price fluctuations may not be successful in offsetting future increases in those costs or may reduce or eliminate the benefits of any decreases in those costs.

In order to mitigate short-term variation in operating results due to the aforementioned commodity price fluctuations, the Company hedged a portion of near-term exposure to certain raw materials used in production processes, primarily copper, nickel, tin, zinc, high-grade aluminum and aluminum alloy. The results of this hedging practice could be positive, neutral or negative in any period depending on price changes in the hedged exposures.

Our hedging activities are not designed to mitigate long-term commodity price fluctuations and, therefore, will not protect from long-term commodity price increases. Our future hedging positions may not correlate to actual raw materials costs, which would accelerate the recognition in our operating results of unrealized gains and losses on hedging positions.

If we cannot attract, retain, and motivate employees, we may be unable to compete effectively, and lose the ability to improve and expand our businesses.

Our success and ability to grow depend, in part, on our ability to hire, retain, and motivate sufficient numbers of talented people with the increasingly diverse skills needed to serve clients and expand our business in many locations around the world. We face intense competition for highly qualified, specialized technical, managerial and other personnel. Recruiting, training, retention, and benefit costs place significant demands on our resources. The inability to attract qualified employees in sufficient numbers to meet particular demands or the loss of key management employees or a significant number of our employees could have an adverse effect on us.

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Risks Relating to the Acquisition and Planned Spin-off

We may fail to realize all of the anticipated benefits of the Acquisition or those benefits may take longer to realize than expected. We and, following the planned Spin-off, each separate company may also encounter significant difficulties in integrating the business of Federal-Mogul.

The success of the transaction will depend, in part, on our ability (and the ability of each separate company following the planned Spin-off) (defined below) to realize the anticipated benefits of the Acquisition and planned Spin-off (the "Transaction") and on our (and each separate company's) ability to integrate Federal-Mogul's business in an effective and efficient manner, which is a complex, costly and time-consuming process. The integration process may disrupt business and, if we are unable to successfully integrate Federal-Mogul's business, we (and each separate company) could fail to realize the anticipated benefits of the Transaction. The failure to meet the challenges involved in the integration process and realize the anticipated benefits of the Transaction could cause an interruption of, or a loss of momentum in, our operations and could have a material adverse effect on our (and each separate company's) business, financial condition and results of operations.

In addition, the integration of Federal-Mogul may result in material unanticipated challenges, expenses, liabilities, competitive responses and loss of customers and other business relationships. Additional integration challenges include:

- diversion of management's attention to integration matters;
- difficulties in achieving anticipated cost savings, synergies, business opportunities and growth prospects from the Transaction;
- difficulties in the integration of operations and systems;
- difficulties in conforming standards, controls, procedures and accounting and other policies, business cultures and compensation structures;
- difficulties in the assimilation of employees;
- difficulties in managing the expanded operations of a significantly larger and more complex company;
- challenges in attracting and retaining key personnel;
- the impact of potential liabilities the Company may be inheriting from Federal-Mogul; and
- coordinating a geographically dispersed organization.

Many of these factors are outside of our control and could result in increased costs, decreases in the amount of anticipated revenues and diversion of management's time and energy, each of which could adversely affect our (and each separate company's) business, financial condition and results of operations.

In addition, even if the integration of Federal-Mogul's business is successful, we (and each separate company) may not realize all of the anticipated benefits of the Transaction, including the synergies, cost savings, or sales or growth opportunities. These benefits may not be achieved within the anticipated time frame, or at all. Further, additional unanticipated costs may be incurred in the integration process. All of these factors could cause reductions in earnings per share, decrease or delay the expected accretive effect of the transaction and negatively impact the price of shares of our Common Stock (or each separate company's stock). As a result, it cannot be assured that the Transaction will result in the realization of the anticipated benefits and potential synergies.

Our current stockholders may have reduced ownership and voting interests following the exercise of certain rights under the Purchase Agreement and exercise less influence over management.

We have granted certain registration rights to AEP for the resale of the shares issued in connection with the Acquisition. These registration rights would facilitate the resale of such shares into the public market, and any such resale would increase the number of shares of our Class A Common Stock available for public trading. Sales of a substantial number of shares of our Class A Common Stock in the public market, or the perception that such sales might occur, could have a material adverse effect on the price of our Class A Common Stock.

If AEP transfers any shares of its Class B Common Stock to a third-party, the shares of Class B Common Stock so transferred will automatically convert in shares of Class A Common Stock and as a result, our current stockholders will experience a proportionate reduction in voting power.

The market price of our Class A Common Stock may be affected by factors different from those affecting the shares of our Common Stock prior to the completion of the Acquisition.

Our historical business differs from that of Federal-Mogul. Accordingly, our results of operations and the market price of our Common Stock following the completion of the Acquisition may be affected by factors that differ from those that previously affected the independent results of operations of each of Tenneco and Federal-Mogul and the market price of our existing common stock prior to the completion of the Acquisition.

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The planned Spin-Off following the transaction is subject to various risks and uncertainties and may not be completed in accordance with the expected plans or anticipated timeline, or at all, and will involve significant time and expense, which could disrupt or adversely affect our business.

We intend to separate the combined company's businesses to create two new independent, publicly traded companies in a planned Spin-Off transaction. The planned Spin Off is intended to be treated as a tax-free reorganization for U.S. federal income tax purposes. There can be no assurance that the planned Spin-Off will be completed at all or that the planned Spin-Off will be tax-free for U.S. federal income purposes. We expect that the process of completing the planned Spin-Off will be time consuming and involve significant costs and expenses, which may be significantly higher than what we currently anticipate and may not yield a benefit if the planned Spin-Off is not completed. We may encounter unforeseen impediments to the completion of the planned Spin-Off that render it impossible or impracticable.

If the planned Spin-Off is not completed, our business, financial condition and results of operations may be materially adversely affected and the market price of our Common Stock may decline significantly, particularly to the extent that the current market price reflects a market assumption that the planned Spin-Off will be completed. If the completion of the planned Spin-Off is delayed, including by the receipt of an acquisition proposal, our business, financial condition and results of operations may be materially adversely affected.

The tendency of the planned Spin-Off and impact of the Transaction could adversely affect our business, financial results and operations.

The announcement and tendency of the planned Spin-Off could cause disruptions and create uncertainty surrounding our business and affect our relationships with our customers, suppliers and employees.

As a result of the Transaction, some customers, suppliers or strategic partners may terminate their business relationship with us. Potential customers, suppliers or strategic partners may delay entering into, or decide not to enter into, a business relationship with us because of the Transaction. If customer or supplier relationships or strategic alliances are adversely affected by the Transaction, our (and each separate company's after the planned Spin-Off) business, financial condition and results of operations following the Acquisition or planned Spin-Off could be adversely affected.

We are dependent on the experience and industry knowledge of our officers and other key employees to execute our business plans. Our success after and in implementing the Transaction depends in part upon the ability to retain key management personnel and other key employees. Current and prospective employees of the Company may experience uncertainty about their roles with the combined company following the Acquisition or either separate company following the planned Spin-Off, or concerns regarding operations following the Transaction, any of which may have an adverse effect on the ability to attract or retain key management and other key personnel. Accordingly, no assurance can be given that we (or each separate company after the planned Spin-Off) will be able to attract or retain key management personnel and other key employees following the Transaction to the extent that we have previously been able to attract or retain such employees.

In addition, we have diverted, and will continue to divert, significant management resources to complete the Transaction, which could adversely impact our ability to manage existing operations or pursue alternative strategic transactions, which could adversely affect our business, financial condition and results of operations.

The planned Spin-Off may not achieve some or all of the anticipated benefits.

We may not realize some or all of the anticipated strategic, financial, operational or other benefits from the planned Spin-Off. As new independent, publicly traded companies, the two companies will be smaller, less diversified companies with a narrower business focus. As a result, the two companies may be more vulnerable to changing market conditions, which could result in increased volatility in their cash flows, working capital and financing requirements and could have a material adverse effect on the respective business, financial condition and results of operations of each company. Further, there can be no assurance that the combined value of the common stock of the two companies will be equal to or greater than what the value of our common stock would have been had the planned Spin-Off not occurred.

The combined company prior to the planned Spin-Off and, if the planned Spin-Off is completed, each separate company following the Spin-Off may underperform relative to our expectations.

Following completion of the Transaction, the combined company or each separate company may not be able to maintain the growth rate, levels of revenue, earnings or operating efficiency that we and Federal-Mogul have achieved or might achieve separately. The failure to do so could have a material adverse effect on our business, financial condition and results of operations or, following the planned Spin-Off, the business, financial condition and results of operations of each separate company.

We have incurred, and will continue to incur, significant transaction costs in connection with the Transaction that could adversely affect our results of operations.

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We have incurred, and will continue to incur, significant costs in connection with integrating the business and operations of Federal-Mogul with our business and operations and effectuating the planned Spin-Off. We may also incur additional unanticipated costs in the separation processes. These could adversely affect our business, financial condition and results of operations, or the business, financial condition and results of operations of each company following the planned Spin-Off, in the period in which such expenses are recorded, or the cash flows, in the period in which any related costs are actually paid.

Furthermore, we and each company following the planned Spin-Off may incur material restructuring charges in connection with integration activities or the planned Spin-Off, which may adversely affect operating results for the period in which such expenses are recorded, or cash flows in the period in which any related costs are actually paid.

We may incur greater costs following the planned Spin-Off, which could decrease our profitability.

Our businesses are operating in conjunction with one another, allowing us in certain circumstances to take advantage of the combined businesses' size and purchasing power in procuring certain goods and services. After the planned Spin-Off, we may be unable to obtain goods and services at prices or on terms as favorable to us as those we obtained prior to the planned Spin-Off. Our businesses also benefit from certain shared functions and services. Following the planned spin-off, we will retain some of these functions and services, and the entity to be spun off ("DRiV Incorporated" or "DRiV™") will retain some of these functions and services. As to those functions and services DRiV retains, DRiV will provide certain of them to us on a short-term transitional basis after the planned Spin-Off, and we will be required to establish the necessary infrastructure and systems to provide these functions and services on an ongoing basis. As to those functions and services we retain, we will provide DRiV certain transition services on a short-term transitional basis after the planned Spin-Off. We may not be able to replace the services provided by DRiV in a timely manner or on terms and conditions as favorable as those we receive from DRiV, and it may cost us more to provide services to DRiV than DRiV pays us for those services. If functions previously performed by DRiV, or services provided by us to DRiV, cost us more than the amounts reflected in our historical financial statements, our profitability could decrease.

We could incur substantial additional costs and experience temporary business interruptions to transition information technology infrastructure in connection with the planned Spin-Off.

We may incur temporary interruptions in business operations if we and DRiV cannot transition effectively from the existing transactional and operational systems and data centers retained by the other, or from the transition services that support these functions. We may not be successful in implementing new systems and transitioning data, and we may incur substantially higher costs for implementation than currently anticipated. Our failure to avoid operational interruptions as we implement any necessary new systems, our failure to implement any new systems and replace services successfully, or the insufficiency of our business continuity and disaster recovery capabilities in the event of a disruption of our information technology services, could disrupt our business and have a material adverse effect on our profitability. In addition, if we are unable to replicate or transition certain systems, our ability to comply with regulatory requirements could be impaired.

DRiV may not satisfy its obligations under various agreements that have been or will be executed as part of the planned Spin-Off.

In connection with the planned spin-off, we and DRiV will enter various agreements that govern the allocation of assets and liabilities between the two company and other matters. Included among these agreements will be a Separation and Distribution Agreement, Employee Matters Agreement, Transition Services Agreement, Tax Matters Agreement, Intellectual Property Matters Agreement and certain other agreements. Certain of these agreements will provide for the performance of services by each company for the benefit of the other for a period of time after the planned Spin-Off. We will rely on DRiV to satisfy its performance and payment obligations under these agreements. If DRiV is unable to satisfy its obligations under these agreements, including its indemnification obligations, we could incur operational difficulties or losses.

There could be significant liability if the planned Spin-Off is determined to be a taxable transaction.

A condition to the planned spin-off is our receipt of an opinion from certain tax advisors with respect to certain U.S. federal income tax consequences of the DRiV spin-off, each of which is in substance and form satisfactory to us. The opinion is expected to conclude that the planned spin-off of 100% of the outstanding DRiV shares to our stockholders and certain related transactions will qualify as tax-free to us and our stockholders under Sections 355 and 368 of the Internal Revenue Code, except to the extent of any cash received in lieu of fractional shares of DRiV's common stock. Any such opinion is not binding on the U.S. Internal Revenue Service ("IRS"). Accordingly, the IRS may reach conclusions with respect to the DRiV that are different from the conclusions reached in the opinion. The opinion will rely on certain facts, assumptions, representations and undertakings from us and DRiV regarding the past and future conduct of the companies' respective businesses and other matters, which, if incomplete, incorrect or not satisfied, could alter the conclusions of the party giving such opinion or ruling.

If the planned Spin-Off ultimately is determined to be taxable, the Spin-Off could be treated as a taxable dividend to our stockholders for U.S. federal income tax purposes, and our stockholders could incur significant U.S. federal income tax liabilities. In addition, we would recognize a taxable gain to the extent that the fair market value of DRiV common stock

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exceeds our tax basis in such stock on the date of the planned Spin-Off. The Tax Matters Agreement we will enter into with DRiV will address which company is responsible for any taxes imposed as a result of the planned Spin-Off.

ITEM 1B.UNRESOLVED STAFF COMMENTS.

None.

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ITEM 2.PROPERTIES.

We lease our principal executive offices, which are located at 500 North Field Drive, Lake Forest, Illinois, 60045.

	Reportable Segments					
	Clean Air	Ride Performance	Aftermarket	Powertrain	Motorparts	Total
Manufacturing plants:						
North America	15	7	2	23	10	57
Europe	20	7	1	33	13	74
South America	2	3	—	5	3	13
Asia Pacific	27	8	2	24	5	66
	64	25	5	85	31	210
Engineering and technical facilities	5	7	—	14	11	37
Shared engineering and technical facilities (1)	—	3	—	—	—	3
Distribution centers and warehouses	—	—	22	—	36	58
Total as of December 31, 2018	69	35	27	99	78	308
Lease	38	9	23	25	45	140
Own	31	26	4	74	33	168
Total	69	35	27	99	78	308

(1) Clean Air shares three engineering and technical facilities with Ride Performance.

The above-described manufacturing locations are located in Argentina, Australia, Belgium, Brazil, Canada, China, Czech Republic, Denmark, France, Germany, Hungary, India, Italy, Japan, Mexico, Morocco, Philippines, Poland, Portugal, Russia, Romania, Spain, South Africa, South Korea, Sweden, Thailand, Turkey, the United Kingdom, the United States and Vietnam.

We hold 35 of the above-described international manufacturing facilities through joint ventures in which we own controlling interest. In addition, five joint ventures in which we hold a noncontrolling interest operate eight manufacturing facilities in Europe, Asia and North America, which are not included in the table above.

We also have warehouses and distribution facilities at our manufacturing sites and a few off-site locations, substantially all of which we lease, and a network of 11 technical support centers that provide some of the most comprehensive training programs in the industry that educate our partners and customers with emerging vehicle technologies and vehicle repair operational skills.

We believe that substantially all of our plants and equipment are, in general, well maintained and in good operating condition. They are considered adequate for present needs and, as supplemented by planned construction, are expected to remain adequate for the near future.

We also believe that we generally have satisfactory title to the properties owned and used in our respective businesses. In the United States, substantially all of our owned real property is pledged to secure our obligations under our senior credit facility.

ITEM 3.LEGAL PROCEEDINGS.

We are involved in environmental remediation matters, legal proceedings, claims (including warranty claims) and investigations. These matters are typically incidental to the conduct of our business and create the potential for contingent losses. We accrue for potential contingent losses when our review of available facts indicates that it is probable a loss has been incurred and the amount of the loss is reasonably estimable. Each quarter we assess our loss contingencies based upon currently available facts, existing technology, presently enacted laws and regulations and taking into consideration the likely effects of inflation and other societal and economic factors and record adjustments to these reserves as required. As an example, we consider all available evidence, including prior experience in remediation of contaminated sites, other companies' cleanup experiences and data released by the U.S. Environmental Protection Agency or other organizations when we evaluate our environmental remediation contingencies. All of our loss contingency estimates are subject to revision in future periods based on actual costs or new information. With respect to our environmental liabilities, where future cash flows are fixed or reliably determinable, we have discounted those liabilities. We evaluate recoveries separately from the liability and, when they are assured, recoveries are recorded and reported separately from the associated liability in our consolidated financial statements.

Environmental Matters

We are subject to a variety of environmental and pollution control laws and regulations in all jurisdictions in which we operate. We have been notified by the U.S. Environmental Protection Agency, other national environmental agencies, and various provincial and state agencies that we may be a potentially responsible party ("PRP") under such laws for the cost of remediating hazardous substances pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") and other national and state or provincial environmental laws. PRP designation typically requires the funding of site investigations and subsequent remedial activities. Many of the sites that are likely to be the costliest to remediate are often current or former commercial waste disposal facilities to which numerous companies sent wastes. Despite the potential joint and several liability which might be imposed on us under CERCLA and some of the other laws pertaining to these sites, our share of the total waste sent to these sites generally has been small. We believe our exposure for liability at these sites is limited.

On a global basis, we have also identified certain other present and former properties at which we may be responsible for cleaning up or addressing environmental contamination, in some cases as a result of contractual commitments and/or federal or state environmental laws. We are actively seeking to resolve these actual and potential statutory, regulatory, and contractual obligations.

We expense or capitalize, as appropriate, expenditures for ongoing compliance with environmental regulations. As of December 31, 2018, we have the obligation to remediate or contribute towards the remediation of certain sites, including the sites discussed above at which we may be a PRP. Our aggregated estimated share of environmental remediation costs for all these sites on a discounted basis was approximately $40 million as of December 31, 2018, of which $12 million is recorded in accrued expenses and other current liabilities and $28 million is recorded in deferred credits and other liabilities in our consolidated balance sheets. For those locations where the liability was discounted, the weighted average discount rate used was 2.9%. The undiscounted value of the estimated remediation costs was $46 million as of December 31, 2018. Our expected payments of environmental remediation costs for non-indemnified locations are estimated to be approximately $10 million in 2019, $6 million in 2020, $3 million in both 2021 and 2022, $2 million in 2023 and $16 million in aggregate thereafter.

In addition to amounts described above, we estimate that we will make expenditures for property, plant and equipment for environmental matters of approximately $14 million in 2019 and $7 million in 2020.

Based on information known to us from site investigations and the professional judgment of consultants, we have established reserves that we believe are adequate for these costs. Although we believe these estimates of remediation costs are reasonable and are based on the latest available information, the costs are estimates, difficult to quantify based on the complexity of the issues, and are subject to revision as more information becomes available about the extent of remediation required. At some sites, we expect that other parties will contribute to the remediation costs. In addition, certain environmental statutes provide that our liability could be joint and several, meaning that we could be

required to pay amounts in excess of our share of remediation costs. The financial strength of other PRPs at these sites has been considered, where appropriate, in our determination of our estimated liability. We do not believe that any potential costs associated with our current status as a PRP, or as a liable party at the other locations referenced herein, will be material to our annual consolidated financial position, results of operations, or liquidity.

Antitrust Investigations and Litigation

On March 25, 2014, representatives of the European Commission (EC) were at Tenneco GmbH's Edenkoben, Germany administrative facility to gather information in connection with an ongoing global antitrust investigation concerning multiple automotive suppliers. On the same date, we also received a related subpoena from the U.S. Department of Justice (“DOJ”).

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On November 5, 2014, the DOJ granted conditional leniency to Tenneco, its subsidiaries and its 50% affiliates as of such date ("2014 Tenneco Entities") pursuant to an agreement we entered into under the Antitrust Division's Corporate Leniency Policy. This agreement provides important benefits to the 2014 Tenneco Entities in exchange for our self-reporting of matters to the DOJ and our continuing full cooperation with the DOJ's resulting investigation. For example, the DOJ will not bring any criminal antitrust prosecution against the 2014 Tenneco Entities, nor seek any criminal fines or penalties, in connection with the matters we reported to the DOJ. Additionally, there are limits on the liability of the 2014 Tenneco Entities related to any follow-on civil antitrust litigation in the United States. The limits include single rather than treble damages, as well as relief from joint and several antitrust liability with other relevant civil antitrust action defendants. These limits are subject to us satisfying the DOJ and any court presiding over such follow-on civil litigation.

On April 27, 2017, we received notification from the EC that it has administratively closed its global antitrust inquiry regarding the production, assembly, and supply of complete exhaust systems. No charges against us or any other competitor were initiated at any time and the EC inquiry is now closed.

Certain other competition agencies are also investigating possible violations of antitrust laws relating to products supplied by us and our subsidiaries, including Federal-Mogul. We have cooperated and continue to cooperate fully with all of these antitrust investigations, and have taken other actions to minimize our potential exposure.

The Company and certain of its competitors are also currently defendants in civil putative class action litigation, and are subject to similar claims filed by other plaintiffs, in the United States and Canada. More related lawsuits may be filed, including in other jurisdictions. Plaintiffs in these cases generally allege that defendants have engaged in anticompetitive conduct, in violation of federal and state laws, relating to the sale of automotive exhaust systems or components thereof. Plaintiffs seek to recover, on behalf of themselves and various purported classes of purchasers, injunctive relief, damages and attorneys’ fees. However, as explained above, because the DOJ granted conditional leniency to the 2014 Tenneco Entities, our civil liability in United States follow-on actions with respect to these entities is limited to single damages and we will not be jointly and severally liable with the other defendants, provided that we have satisfied our obligations under the DOJ leniency agreement and approval is granted by the presiding court. Typically, exposure for follow-on actions in Canada is less than the exposure for U.S. follow-on actions.

Following the EC’s decision to administratively close its antitrust inquiry into exhaust systems in 2017, receipt by the 2014 Tenneco Entities of conditional leniency from the DOJ and discussions during the third quarter of 2017 following the appointment of a special settlement master in the civil putative class action cases pending against the Company and/or certain of its competitors in the United States, the Company continues to vigorously defend itself and/or take actions to minimize its potential exposure to matters pertaining to the global antitrust investigation, including engaging in settlement discussions when it is in the best interests of the Company and its stockholders. For example, in October 2017, we settled an administrative action brought by Brazil's competition authority for an amount that was not material. In December 2018, we settled a separate administrative action brought by Brazil’s competition authority against a Federal-Mogul subsidiary, also for an amount that was not material.

Additionally, in February 2018, we settled civil putative class action litigation in the United States brought by classes of direct purchasers, end-payors and auto dealers. No other classes of plaintiffs have brought claims against us in the United States. Based upon earlier developments, including settlement discussions, we established a reserve of $132 million in our second quarter 2017 financial results for settlement costs that were probable, reasonably estimable, and expected to be necessary to resolve our antitrust matters globally, which primarily involves the resolution of civil suits and related claims. Of the $132 million reserve that was established, $79 million was paid through December 31, 2018 resulting in a remaining reserve of $53 million as of December 31, 2018, which is recorded in accrued expenses and other current liabilities in our consolidated balance sheets. While the Company, including its Federal-Mogul subsidiaries, continues to cooperate with certain competition agencies investigating possible violations of antitrust laws relating to products supplied by the Company, and the Company may be subject to other civil lawsuits and/or related claims, no amount of this reserve is attributable to matters with the DOJ or the EC, and no such amount is expected based on current information.

Our reserve for antitrust matters is based upon all currently available information and an assessment of the probability of events for those matters where we can make a reasonable estimate of the costs to resolve such outstanding matters. Our estimate involves significant judgment, given the number, variety and potential outcomes of actual and potential claims, the uncertainty of future rulings and approvals by a court or other authority, the behavior or incentives of adverse parties or regulatory authorities, and other factors outside of our control. As a result, our reserve may change from time to time, and actual costs may vary. Although the ultimate outcome of any legal matter cannot be predicted with certainty, based on current information, we do not expect that any such change in the reserve will have a material adverse impact on our annual consolidated financial position, results of operations or liquidity.

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Other Legal Proceedings, Claims and Investigations

For many years we have been and continue to be subject to lawsuits initiated by claimants alleging health problems as a result of exposure to asbestos. Our current docket of active and inactive cases is less than 500 cases in the United States and less than 50 in Europe.

With respect to the claims filed in the United States, the substantial majority of the claims are related to alleged exposure to asbestos in our line of Walker® exhaust automotive products although a significant number of those claims appear also to involve occupational exposures sustained in industries other than automotive. A small number of claims have been asserted against one of our subsidiaries by railroad workers alleging exposure to asbestos products in railroad cars. We believe, based on scientific and other evidence, it is unlikely that U.S. claimants were exposed to asbestos by our former products and that, in any event, they would not be at increased risk of asbestos-related disease based on their work with these products. Further, many of these cases involve numerous defendants, with the number in some cases exceeding 100 defendants from a variety of industries. Additionally, in many cases the plaintiffs either do not specify any, or specify the jurisdictional minimum, dollar amount for damages.

With respect to the claims filed in Europe, the substantial majority relate to occupational exposure claims brought by current and former employees of Federal-Mogul facilities in France and amounts paid out were not material. A small number of occupational exposure claims have also been asserted against Federal-Mogul entities in Italy and Spain.

As major asbestos manufacturers and/or users continue to go out of business or file for bankruptcy, we may experience an increased number of these claims. We vigorously defend ourselves against these claims as part of our ordinary course of business. In future periods, we could be subject to cash costs or charges to earnings if any of these matters are resolved unfavorably to us. To date, with respect to claims that have proceeded sufficiently through the judicial process, we have regularly achieved favorable resolutions. Accordingly, we presently believe that these asbestos-related claims will not have a material adverse impact on our annual consolidated financial position, results of operations or liquidity.

In connection with Federal-Mogul's emergence from bankruptcy in 2008, trusts were funded and established to assume liability for and resolve Federal-Mogul's legacy asbestos liabilities in the United States and United Kingdom. Accordingly, those legacy liabilities in the United States and United Kingdom have had no ongoing impact on Federal-Mogul, Tenneco or their operations.

We are also from time to time involved in other legal proceedings, claims or investigations. Some of these matters involve allegations of damages against us relating to environmental liabilities (including toxic tort, property damage and remediation), intellectual property matters (including patent, trademark and copyright infringement, and licensing disputes), personal injury claims (including injuries due to product failure, design or warning issues, and other product liability related matters), taxes, unclaimed property, employment matters, and commercial or contractual disputes, sometimes related to acquisitions or divestitures. Additionally, some of these matters involve allegations relating to legal compliance.

While we vigorously defend ourselves against all of these legal proceedings, claims and investigations and take other actions to minimize our potential exposure, in future periods, we could be subject to cash costs or charges to earnings if any of these matters are resolved on unfavorable terms. Although the ultimate outcome of any legal matter cannot be predicted with certainty, based on current information, including our assessment of the merits of the particular claim, except as described above under "Antitrust Investigations", we do not expect the legal proceedings, claims or investigations currently pending against us will have any material adverse impact on our annual consolidated financial position, results of operations or liquidity.

Warranty Matters

We provide warranties on some of our products. The warranty terms vary but range from one year up to limited lifetime warranties on some of our premium aftermarket products. Provisions for estimated expenses related to product warranty are made at the time products are sold or when specific warranty issues are identified with our products. These estimates are established using historical information about the nature, frequency, and average cost of warranty claims. We actively study trends of our warranty claims and take action to improve product quality and

minimize warranty claims. We believe that the warranty reserve is appropriate; however, actual claims incurred could differ from the original estimates, requiring adjustments to the reserve. The reserve is included in both "accrued expenses and other current liabilities" and "deferred credits and other liabilities" in the consolidated balance sheets.

ITEM 4.MINE SAFETY DISCLOSURES.
Not applicable.

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ITEM 4.1.EXECUTIVE OFFICERS OF THE REGISTRANT.

The following provides information concerning the persons who serve as our executive officers as of March 15, 2019.

Name and Age	Offices Held
Brian J. Kesseler (52)	Co-Chief Executive Officer
Roger J. Wood (56)	Co-Chief Executive Officer
Bradley S. Norton (55)	Executive Vice President and President Original Equipment
Peng (Patrick) Guo (53)	Executive Vice President and President Clean Air
Rainer Jueckstock (59)	Executive Vice President and President Powertrain
Jason M. Hollar (45)	Executive Vice President Finance and Chief Financial Officer
Kaled Awada (44)	Senior Vice President and Chief Human Resources Officer
Gregg A. Bolt (59)	Senior Vice President Integration Office
Ben P. Patel (51)	Senior Vice President and Chief Technology Officer
Brandon B. Smith (38)	Senior Vice President, General Counsel and Corporate Secretary
John S. Patouhas (52)	Vice President and Chief Accounting Officer

Brian J. Kesseler — Mr. Kesseler became Co-Chief Executive Officer in October 2018. He was previously Chief Executive Officer from May 2017 to September 2018. He served as Chief Operating Officer from January 2015 to May 2017. Prior to joining Tenneco, he spent more than 20 years working for Johnson Controls Inc., most recently serving as President of the Johnson Controls Power Solutions business. In 2013, he was elected a corporate officer, and was a member of the Johnson Controls executive operating team. Mr. Kesseler also served as the sponsor of Johnson Controls' Manufacturing Operations Council. Mr. Kesseler joined JCI in 1994 and during his tenure held leadership positions in all of the company's business units, including serving as Vice President and General Manager, Service-North America, Systems and Services Europe, and Unitary Products Group, for the Building Efficiency business. He began his career with the Ford Motor Company in 1989 and worked in North America Assembly Operations for five years, specializing in manufacturing management. Mr. Kesseler became a director of our company in October 2016.

Roger J. Wood — Mr. Wood became Co-Chief Executive Officer in October 2018. Mr. Wood retired in 2015 as Dana Holding Corporation's (now known as Dana Incorporated) President and Chief Executive Officer, a position he held since 2011, when he joined Dana. Prior to joining Dana Holding Corporation, Mr. Wood served as Executive Vice President and Group President for the Engine Group at BorgWarner. In his 26-year career at BorgWarner, Mr. Wood served in various leadership roles with global operation responsibilities. He is a member of the board of directors of Brunswick Corporation and Executive Director of Fallbrook Technologies. Mr. Wood has been a director of our company since 2016.

Bradley S. Norton — Mr. Norton joined Tenneco as Executive Vice President in October 2018. Prior to joining Tenneco, Mr. Norton was Co-Chairman of the Board and Co-Chief Executive Officer of Federal-Mogul Holdings LLC from March 2017 to September 2018, and Chief Executive Officer, Federal-Mogul Motorparts from July 2014 to March 2017. He was also elected to the Board of Managers of Federal-Mogul LLC in March 2017. Prior to that appointment, Mr. Norton was Senior Vice President, Chassis & Service, Federal-Mogul Motorparts beginning in July 2014.

Peng (Patrick) Guo — Mr. Guo was named Executive Vice President and President Clean Air in March 2017. Previously, Mr. Guo was Executive Vice President, Asia Pacific since December 2016, and was Senior Vice President and General Manager, Asia Pacific from October 2014 until December 2016. Mr. Guo served as Vice President and Managing Director, China from 2007 until October 2014. From 1996 to 2003, Mr. Guo served as General Manager, Asia Aftermarket Operations while based in Beijing, China. He left Tenneco in October 2003 to become president of the AGC Automotive China Operations for the Asahi Glass Company. He returned to Tenneco in July 2007. Before joining Tenneco, Mr. Guo was an engineer at the Ford Motor Company, which included assignments in manufacturing, quality and product design.

Rainer Jueckstock — Mr. Jueckstock joined Tenneco as Executive Vice President and President Powertrain in October 2018. Prior to joining Tenneco, Mr. Jueckstock was Co-Chairman of the Board and Co-Chief Executive Officer of Federal-Mogul LLC from 2014 to 2018, and Chief Executive Officer, Federal-Mogul Powertrain from 2012 to 2018. Prior to his Co-Chairman and Co-Chief Executive Officer positions, Mr. Jueckstock was Senior Vice President, Powertrain Energy from 2005 to 2012, a member of the Strategy Board from 2005 to 2012 and an officer of Federal-Mogul Corporation from 2005 to 2012. He is a director of Plexus Corp.

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Jason M. Hollar — Mr. Hollar became Executive Vice President and Chief Financial Officer in July 2018. He joined Tenneco as Senior Vice President Finance and served from June 2017 to June 2018. Prior to joining Tenneco, Mr. Hollar was Chief Financial Officer of Sears Holdings Corporation beginning in October 2016 and has served as Senior Vice President, Finance of Sears since October 2014. Previously, he was with Delphi Automotive PLC, serving from December 2013 to September 2014 as Vice President and Corporate Controller and from April 2011 to November 2013 as CFO, Powertrain Systems and Delphi Europe, Middle East and Africa.

Kaled Awada — Mr. Awada joined Tenneco as Senior Vice President and Chief Human Resources Officer in September 2018. Prior to joining Tenneco, Mr. Awada held Human Resources leadership positions of increasing responsibility at Aptiv PLC for three years, most recently Global Vice President, Human Resources, for the company's electrical distribution systems business. He previously held global Human Resources roles with Eaton Corporation, Textron Fastening Systems, and Faurecia Exhaust Systems.

Gregg A. Bolt — Mr. Bolt has been the Senior Vice President Integration Office since September 2018. He served as Senior Vice President Global Human Resources and Administration from February 2013 to August 2018. Prior to joining Tenneco, Mr. Bolt worked for Quad/Graphics, Inc. as Executive Vice President, Human Resources and Administration from March 2009 to January 2013. Previously, he was with Johnson Controls Inc. for more than 10 years, serving most recently as Vice President, Human Resources for JCI’s Building Efficiency division.

Ben P. Patel — Dr. Patel has been the Senior Vice President and Chief Technology officer since October 2018; he served as the Vice President and Chief Technology Officer since March 2017. He served as Vice President, Global Research and Development, Clean Air from March 2012 to March 2017 and Vice President, Technology Development, Emission Control from January 2011 to February 2012. Prior to joining Tenneco in 2011, Dr. Patel worked at GE Global Research Center from July 1998 to December 2007, where he held the position of senior scientist. From January 2008 to December 2010 he served as technology portfolio manager for GE Technology Ventures, a division of General Electric's corporate trading and licensing group. He is a director of Lincoln Electric Holdings, Inc.

Brandon B. Smith — Mr. Smith has served as our Senior Vice President, General Counsel and Corporate Secretary since February 2018 and is responsible for managing our worldwide legal affairs including corporate governance and compliance. Previously, he served as our Vice President, Deputy General Counsel and Assistant Secretary since November 2014 and Interim General Counsel since October 2017. Mr. Smith also served as our Assistant General Counsel from April 2011 to November 2014 and as our Senior Corporate Counsel from November 2010 until April 2011. Mr. Smith joined Tenneco in July 2008 as Corporate Counsel. Prior to joining Tenneco, Mr. Smith was a corporate attorney with Kirkland & Ellis LLP, representing both public and private enterprises on a wide variety of corporate engagements.

John S. Patouhas — Mr. Patouhas has served as our Vice President and Chief Accounting Officer since February 2019. Mr. Patouhas served since 2015 as Vice President and Chief Accounting Officer of Federal-Mogul (a subsidiary of Tenneco since October 2018). From 2011 to 2015, Mr. Patouhas was Vice President and Corporate Controller at Altair Engineering, a product design and development, engineering software and cloud computing software provider. He has over 20 years’ experience in financial reporting and corporate accounting at a variety of companies, and began his career as an auditor with Deloitte. Mr. Patouhas is a CPA and CGMA, and has an MBA from Wayne State University.

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PART II

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

Our outstanding shares of Class A Common Stock, par value $0.01 per share, are listed on the New York Stock Exchange under the symbol "TEN". On February 1, 2017, we announced the reinstatement of a quarterly dividend program under which we expect to pay a quarterly dividend of $0.25 per share on our common stock, representing a planned annual dividend of $1.00 per share. The Company did not pay any dividends in fiscal year 2016. While we currently expect to pay comparable quarterly cash dividends in the near future, our dividend program and the payment of future cash dividends are subject to continued capital availability, the judgment of our Board of Directors and our continued compliance with the provisions pertaining to the payment of dividends under our debt agreements. Once the contemplated separation of our businesses through a spin-off occurs, each independent company will determine its own dividend policy.

For additional information concerning our payment of dividends, see “Management’s Discussion and Analysis of Financial Condition and Results of Operations” included in Item 7.

As of March 11, 2019, there were approximately 10,100 holders of record of our class A common stock, including brokers and other nominees and two holders of record of our class B common stock.

Purchase of equity securities by the issuer and affiliated purchasers

The following table provides information relating to our purchase of shares of our class A common stock in the fourth quarter of 2018. These purchases include shares withheld upon vesting of restricted stock for minimum tax withholding obligations. We generally intend to continue to satisfy statutory minimum tax withholding obligations in connection with the vesting of outstanding restricted stock through the withholding of shares.

Period	Total Number of Shares Purchased (1)	Average Price Paid	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Maximum Value of Shares That May Yet be Purchased Under These Plans or Programs (Millions)
October 2018	328	$ 35.37	—	$ 231
November 2018	—	$ —	—	$ 231
December 2018	—	$ —	—	$ 231
Total	328	$ 35.37	—	$ 231

(1) Shares withheld upon vesting of restricted stock in the fourth quarter of 2018.

During 2015, our Board of Directors approved a share repurchase program, authorizing us to repurchase up to $550 million of our then outstanding common stock over a three-year period ("2015 Program"). We purchased 4,182,613 shares in 2016 through open market purchases, which were funded through cash from operations, at a total cost of $225 million, at an average price of $53.89 per share. These repurchased shares are held as part of our treasury

stock.

In February 2017, our Board of Directors authorized the repurchase of up to $400 million of our then outstanding common stock over the next three years ("2017 Program"), this included $112 million that remained authorized under the 2015 Program. We generally acquire the shares through open market or privately negotiated transactions, and have historically utilized cash from operations. The repurchase program does not obligate us to repurchase shares within any specific time or situations.

No new share repurchase programs were authorized by our Board of Directors in 2018 and we did not repurchase any shares under the 2017 Program in 2018. Since we announced the repurchase program in January 2015, we have repurchased 11.3 million shares for $607 million through December 31, 2018.

Recent Sales of Unregistered Securities
None.

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Share Performance

The following graph shows a five year comparison of the cumulative total stockholder return on Tenneco's common stock as compared to the cumulative total return of two other indexes: a custom composite index ("Peer Group") and the Standard & Poor's 500 Composite Stock Price Index. The companies included in the Peer Group are: American Axle & Manufacturing Co., BorgWarner Inc., Cummins Inc., Johnson Controls International Plc, Lear Corp., Magna International Inc., and Meritor, Inc. These comparisons assume an initial investment of $100 and the reinvestment of dividends.

*$100 invested on 12/31/13 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31.

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	As of December 31,					
	2013	2014	2015	2016	2017	2018
Tenneco Inc.	$100.00	$100.07	$81.16	$110.43	$105.25	$50.40
S&P 500	100.00	113.69	115.26	129.05	157.22	150.33
Peer Group	100.00	112.87	86.23	108.46	128.12	99.21

The graph and other information furnished in the section titled "Share Performance" under this Part II, Item 5 of this Form 10-K shall not be deemed to be "soliciting" material or to be "filed" with the Securities and Exchange Commission or subject to Regulation 14A or 14C, or to the liabilities of Section 18 of the Securities Exchange Act of 1934, as amended.

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ITEM 6. SELECTED FINANCIAL DATA.

The following data should be read in conjunction with Item 7 — "Management's Discussion and Analysis of Financial Condition and Operations" and our consolidated financial statements in Item 8 — "Financial Statements and Supplementary Data." These items include discussions of factors affecting comparability of the information shown below, including the completion of the Acquisition of Federal-Mogul on October 1, 2018 as discussed in Item 8 — Note 3, Acquisitions and Divestitures.

The amounts below reflect the revisions as discussed in Item 8 — Note 2, Summary of Significant Accounting Policies.

	Year Ended December 31				
	2018	2017	2016	2015	2014
	(Millions Except Share and Per Share Amounts)				
Statements of Income Data:					
Net sales and operating revenues	$11,763	$9,274	$8,597	$8,180	$8,382
Earnings (loss) before interest expense, income taxes, and noncontrolling interests [(a)]	$306	$408	$479	$503	$469
Net income	$111	$265	$415	$291	$261
Net income attributable to Tenneco Inc.	$55	$198	$347	$237	$219
Basic earnings per share of common stock	$0.93	$3.75	$6.20	$3.98	$3.61
Diluted earnings per share of common stock	$0.93	$3.73	$6.15	$3.94	$3.55
Cash dividends declared	$1.00	$1.00	$—	$—	$—
Balance Sheet Data (at year end):					
Total assets	$13,232	$4,796	$4,312	$3,937	$3,964
Short-term debt	$153	$103	$117	$103	$99
Long-term debt	$5,340	$1,358	$1,294	$1,124	$1,055
Redeemable noncontrolling interests	$138	$42	$40	$41	$34
Total equity	$1,916	$682	$573	$425	$497

(a)Includes restructuring and asset impairments for each year as follows:

	Year Ended December 31				
	2018	2017	2016	2015	2014
	(Millions)				
Restructuring and asset impairments, net	$112	$ 47	$ 30	$ 63	$ 49

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

You should read the following discussion and analysis in conjunction with the consolidated financial statements and related notes included in Item 8. — "Financial Statements and Supplementary Data." All references to "Tenneco," "we," "us," "our" and "the Company" refer to Tenneco Inc. and its consolidated subsidiaries. Notes referenced in this discussion and analysis refer to the notes to consolidated financial statements that are found in Item 8.—"Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements."

The consolidated financial statements for the years ended December 31, 2017 and 2016 have been revised to correct for prior period errors as discussed in Item 8 — Note 2, Summary of Significant Accounting Policies. Accordingly, this Management's Discussion and Analysis of Financial Condition and Results of Operations reflect the effects of the revisions.

OVERVIEW

Our Company

We are one of the world’s leading manufacturers of clean air, powertrain and ride performance products and systems for light vehicle, commercial truck, off-highway, industrial and aftermarket customers. Both original equipment (OE) vehicle designers and manufacturers and the repair and replacement markets, or aftermarket, are served globally through leading brands, including Monroe®, Champion®, Öhlins®, MOOG®, Walker®, Fel-Pro®, Wagner®, Ferodo®, Rancho®, Thrush®, National®, and Sealed Power®, among others. As of December 31, 2018, we operated 210 manufacturing facilities worldwide and employed approximately 81,000 people to service our customers’ demands.

Factors that continue to be critical to our success include winning new business awards, managing our overall global manufacturing footprint to ensure proper placement and workforce levels in line with business needs, maintaining competitive wages and benefits, maximizing efficiencies in manufacturing processes and reducing overall costs. In addition, our ability to adapt to key industry trends, (such as a shift in consumer preferences to other vehicles in response to higher fuel costs and other economic and social factors, increasing technologically sophisticated content, changing aftermarket distribution channels, increasing environmental standards and extended product life of automotive parts), also play a critical role in our success. Other factors that are critical to our success include adjusting to economic challenges such as increases in the cost of raw materials and our ability to successfully reduce the impact of any such cost increases through material substitutions, cost reduction initiatives and other methods.

For 2018, light vehicle production was slightly down compared to 2017 in some of the geographic regions in which we operate. Light vehicle production was down 1% in both North America and Europe, and down 4% in China. Light vehicle production was up 6% in India and 3% in South America.

Federal-Mogul Acquisition

On October 1, 2018, we closed the acquisition of Federal-Mogul LLC ("Federal-Mogul"), (the "Acquisition" or the “Federal-Mogul Acquisition”) pursuant to the Membership Interest Purchase Agreement, dated as of April 10, 2018 (the “Purchase Agreement”), by and among us, Federal-Mogul, American Entertainment Properties Corp. (“AEP”) and Icahn Enterprises L.P. (“IEP”). Total consideration was approximately $3.7 billion. See Note 3, Acquisitions and Divestitures to our consolidated financial statements for additional information.

As a result of the Federal-Mogul Acquisition, the number of our reportable segments increased from three to five segments, consisting of: our historical Clean Air, Ride Performance, and Aftermarket segments and the newly

acquired Powertrain and Motorparts segments. Segment information for periods prior to the Federal-Mogul Acquisition do not include amounts for the Federal-Mogul operations.

Our reportable segments, which are also our operating segments, align with how the Chief Operating Decision Maker allocates resources and assesses performance against our key growth strategies. We evaluate segment performance based primarily on earnings before interest expense, income taxes, noncontrolling interests, depreciation and amortization (EBITDA including noncontrolling interests).

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Financial Executive Summary

- We reported total revenue for 2018 of $11,763 million, up 27% from $9,274 million in 2017. The Federal-Mogul acquisition increased revenues by approximately $1,886 million, or 20%, in 2018. The remaining increase in our revenues of $603 million, or 7%, was driven by the growth in Clean Air and Ride Performance segments. Excluding the impact of currency and substrate sales, organic revenue was up $292 million, or 4%, from $7,087 million to $7,379 million, which was driven primarily by stronger light vehicle volumes, higher commercial truck, off-highway and other vehicle revenues and new platforms.
- Earnings before interest expense, income taxes, and noncontrolling interests (EBIT) was $306 million for 2018, a decrease of $102 million, when compared to $408 million in 2017. Excluding the Federal-Mogul acquisition, EBIT decreased compared to 2017, as higher light vehicle volumes, increased commercial truck, off-highway and other vehicle revenues and new platforms were more than offset by unfavorable mix, price reductions, higher depreciation and amortization expenses, higher restructuring and related expenses, costs related to the Acquisition and expected spin, loss on extinguishment of debt, a litigation settlement charge, and continued investments in growth for new programs. EBIT in 2017 also included a $132 million antitrust settlement accrual, a $11 million goodwill impairment charge and $13 million in charges related to pension derisking and the acceleration of restricted stock vesting. See “Segment Results of Operations” for further information on EBIT including noncontrolling interests.

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RESULTS OF OPERATIONS

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

Consolidated Results of Operations

The following table presents our consolidated results of operations and reflects the revisions as discussed in Item 8 — Note 2, Summary of Significant Accounting Policies:

	Year Ended December 31		Increase / (Decrease)	
	2018	2017	$ Change	% Change (1)
	(Millions Except Percent, Share and Per Share Amounts)			
Revenues				
Net sales and operating revenues	$11,763	$ 9,274	$2,489	27 %
Costs and expenses				
Cost of sales (exclusive of depreciation and amortization)	10,071	7,812	2,259	29 %
Selling, general, and administrative	794	638	156	24 %
Depreciation and amortization	345	226	119	53 %
Engineering, research, and development	204	158	46	29 %
Goodwill impairment charge	3	11	(8)	(73)%
	11,417	8,845	2,572	29 %
Other expense (income)				
Loss on sale of receivables	16	5	11	220 %
Non-service pension and postretirement benefit costs	20	16	4	25 %
Loss on extinguishment of debt	10	1	9	n/m
Equity in (earnings) losses of nonconsolidated affiliates, net of tax	(18)	1	(19)	n/m
Other expense (income), net	12	(2)	14	n/m
	40	21	19	90 %
Earnings before interest expense, income taxes, and noncontrolling interests	306	408	(102)	(25)%
Interest expense	132	72	60	83 %
Earnings before income taxes and noncontrolling interests	174	336	(162)	(48)%
Income tax expense (benefit)	63	71	(8)	(11)%
Net income	111	265	(154)	(58)%
Less: Net income attributable to noncontrolling interests	56	67	(11)	(16)%
Net income attributable to Tenneco Inc.	$55	$ 198	$(143)	(72)%
Earnings per share				
Weighted average shares of common stock outstanding —				
Basic	58,625,087	52,796,184	5,828,903	11 %
Diluted	58,758,732	53,026,911	5,731,821	11 %
Basic earnings per share of common stock	$0.93	$ 3.75	$(2.82)	(75)%
Diluted earnings per share of common stock	$0.93	$ 3.73	$(2.80)	(75)%
Cash dividends declared per share	$1.00	$ 1.00	$—	— %
Percent of revenues				
Cost of sales	86 %	84 %	2 %	
Selling, general, and administrative	7 %	7 %	— %	
EBIT	3 %	4 %	(1)%	

Net income attributable to Tenneco Inc.	— %	2 %	(2)%

(1) Percentages above denoted as "n/m" are not meaningful to present in the table.

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Revenues

Total revenue for 2018 was $11,763 million, up 27% from $9,274 million in 2017. The Federal-Mogul Acquisition increased revenues by approximately $1,886 million, or 20%, in 2018. Excluding the Acquisition, organic revenues increased $603 million, or 7%, driven by the growth in Clean Air and Ride Performance segments. Excluding the impact of currency and substrate sales, organic revenue was up $292 million, or 4%, from $7,087 million to $7,379 million, which was driven primarily by stronger light vehicle volumes, higher commercial truck, off-highway and other vehicle revenues and new platforms. The following table lists the primary drivers behind the change in revenues ($ millions).

Year ended December 31, 2017	$9,274
Federal-Mogul Acquisition	1,886
Drivers in the change of organic revenues:	
Volume and mix	597
Currency exchange rates	12
Others	(6)
Year ended December 31, 2018	$11,763

Cost of sales

Cost of sales for 2018 was $10,071 million, or 86% of sales, compared to $7,812 million, or 84% of sales in 2017. Excluding the Acquisition, organic cost of sales for 2018 was $8,434 million or 85% of organic sales. The following table lists the primary drivers behind the change in cost of sales ($ millions).

Year ended December 31, 2017	$7,812
Federal-Mogul Acquisition	1,637
Drivers in the change of organic cost of sales:	
Volume and mix	556
Material	13
Currency exchange rates	6
Restructuring and cost to achieve synergies	28
Other costs	19
Year ended December 31, 2018	$10,071

The impact of the Federal-Mogul Acquisition increased the cost of sales by $1,637 million in 2018. The remaining increase in our organic cost of sales was mainly due to the year-over-year increase in volume, higher material costs, higher restructuring and costs to achieve synergies, higher manufacturing and impact of currency. Also refer to section below "Restructuring charges."

Selling, general and administrative (SG&A)

SG&A was up $156 million in 2018, at $794 million, compared to $638 million in 2017. The increase was due primarily to the impact of the Federal-Mogul Acquisition. Excluding the Acquisition, included in 2018 was $92 million of Acquisition and expected spin costs, $25 million of costs to achieve synergies, $18 million of cost reduction initiatives and $10 million of litigation settlement, while 2017 included a $132 million antitrust settlement accrual and $22 million of cost reduction initiatives. Also refer to section below "Restructuring charges."

Depreciation and amortization

Depreciation and amortization expense was $345 million and $226 million for 2018 and 2017, respectively. The increase was due primarily to the impact of the Federal-Mogul Acquisition.

Engineering, research, and development

Engineering, research, and development expense was $204 million and $158 million in 2018 and 2017, respectively. The increase was due primarily to the impact of the Federal-Mogul Acquisition. Also refer to section below "Restructuring charges."

Goodwill impairment charge

As a result of our goodwill impairment assessment in the fourth quarter of 2018, we determined the fair value of the North America Ride Performance reporting unit was lower than its carrying value. Accordingly, we recorded a full goodwill impairment charge of $3 million in the fourth quarter of 2018. This compared to an $11 million goodwill impairment charge in the fourth quarter of 2017, which related to our Europe and South America Aftermarket and Ride Performance reporting units.

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Non-service pension and postretirement benefit costs
Non-service pension and postretirement benefit costs was up $4 million in 2018 at $20 million compared to $16 million at 2017.

Loss on extinguishment of debt
Loss on extinguishment of debt was $10 million in 2018 related to the repayment of our revolver and term loan A and the new refinancing in connection with the Federal-Mogul Acquisition. This compared to a $1 million charge recognized in 2017.

Equity in earnings (losses) of nonconsolidated affiliates, net of tax
Equity in earnings (losses) of nonconsolidated affiliates, net of tax was up $19 million in 2018, at $18 million, compared to a loss of $1 million in 2017. The increase was due to the impact of Federal-Mogul Acquisition.

Interest expense, net of interest capitalized
Interest expense in 2018 was $132 million (substantially all in our U.S. operations) net of interest capitalized of $5 million, and $72 million (substantially all in our U.S. operations) net of interest capitalized of $8 million in 2017. The $60 million increase was primarily due to higher interest expense pertaining to the five-year $1,700 million term loan A facility and the seven-year
$1,700 million term loan B facility that were entered into in connection with the Acquisition and the interest expense on Federal-Mogul debt obligations assumed in the Acquisition, partially offset by the lower interest expense as a result of the retirement of the Company's term loan A and revolver borrowings on October 1, 2018 related to the Acquisition.

For more detailed explanations on our debt structure and senior credit facility refer to “Liquidity and Capital Resources -Capitalization” later in this Management’s Discussion and Analysis.

Income Taxes
Income tax expense was $63 million on earnings before income taxes and noncontrolling interests of $174 million in 2018 as compared to income tax expense of $71 million on earnings before income taxes and noncontrolling interests of $336 million in 2017. The tax expense recorded in 2018 included tax benefits of $10 million relating to a valuation allowance release at our Australian entities and $11 million of tax expense for changes in the toll tax as discussed below. The tax expense recorded in 2017 includes a net provisional tax expense of $43 million for one-time transition tax on deemed repatriation of previously deferred foreign earnings under the Tax Cuts and Jobs Act ("TCJA") as discussed below. The Company remeasured U.S. deferred taxes from an applicable federal rate of 35% to the new statutory rate of 21% at which they are expected to be utilized, recording a $51 million provisional expense. The tax expense recorded in 2017 included a net tax benefit of $74 million relating to recognizing a U.S. tax benefit for foreign taxes.

Net Income
Net income was $111 million for 2018, as compared to $265 million for 2017, a decrease of $154 million, as result of the aforementioned items.

Earnings before Interest Expense, Income Taxes, Noncontrolling Interests and Depreciation and Amortization (“EBITDA including noncontrolling interests”)
EBITDA including noncontrolling interests was $651 million for 2018, an increase of $17 million, when compared to $634 million in 2017, as a result of the aforementioned items. See “Segment Results of Operations” for further information on EBITDA including noncontrolling interests.

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Restructuring Charges

The classification of our restructuring charges, including costs to achieve synergies and other restructuring actions, in the consolidated statements of income is as follows:

	Year Ended December 31	
	2018	2017
	(Millions)	
Cost of sales	$ 66	$ 41
Engineering, research, and development	4	—
Selling, general, and administrative	40	6
Other expense	2	—
	$ 112	$ 47

See to Item 8 — Note 4, Restructuring Charges and Asset Impairments, Net for further information of restructuring initiatives.

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Segment Results of Operations

Overview of Net Sales and Operating Revenues

Our Clean Air segment has substrate sales. Substrates are porous ceramic filters coated with a catalyst - typically, precious metals such as platinum, palladium and rhodium. We do not manufacture substrates, they are supplied to us by Tier 2 suppliers generally as directed by our OE customers. We generally earn a small margin on these components of the system. These substrate components have been increasing as a percentage of our revenue as the need for more sophisticated emission control solutions increases to meet more stringent environmental regulations, and as we capture more diesel aftertreatment business. While these substrates dilute our gross margin percentage, they are a necessary component of an emission control system.

Our value-add content in an emission control system includes designing the system to meet environmental regulations through integration of the substrates into the system, maximizing use of thermal energy to heat up the catalyst quickly, efficiently managing airflow to reduce back pressure as the exhaust stream moves past the catalyst, managing the expansion and contraction of the emission control system components due to temperature extremes experienced by an emission control system, using advanced acoustic engineering tools to design the desired exhaust sound, minimizing the opportunity for the fragile components of the substrate to be damaged when we integrate it into the emission control system and reducing unwanted noise, vibration and harshness transmitted through the emission control system.

We present these substrate sales separately in the following table because we believe investors utilize this information to understand the impact of this portion of our revenues on our overall business and because it removes the impact of potentially volatile precious metals pricing from our revenues. While our OE customers generally assume the risk of precious metals pricing volatility, it impacts our reported revenues.

Finally, we present these reconciliations of revenues in order to reflect value-add revenues without the effect of changes in foreign currency rates. We have not reflected any currency impact in the base period of the comparisons for measuring the effects of currency in the subsequent year.

The tables below reflects our segment revenues for 2018 and 2017:

	Year Ended December 31, 2018					Year Ended December 31, 2017		
	Revenues	Substrate Sales	Value-add Revenues	Currency Impact on Value-add Revenues	Value-add Revenues excluding Currency	Revenues	Substrate Sales	Value-add Revenues
	(Millions)					(Millions)		
Clean Air	$6,707	$ 2,500	$ 4,207	$ 31	$ 4,176	$6,216	$ 2,187	$ 4,029
Ride Performance	1,949	—	1,949	(4)	1,953	1,807	—	1,807
Aftermarket	1,221	—	1,221	(29)	1,250	1,251	—	1,251
Powertrain	1,112	—	1,112	—	1,112	—	—	—
Motorparts	774	—	774	—	774	—	—	—
Total Tenneco Inc.	$11,763	$ 2,500	$ 9,263	$ (2)	$ 9,265	$9,274	$ 2,187	$ 7,087

Year Ended December 31, 2018
Versus Year Ended December 31, 2017
Dollar and Percent Increase (Decrease)

	Revenues	Percent	Value-add Revenues excluding Currency	Percent
	(Millions Except Percent Amounts)			
Clean Air	$491	8 %	$ 147	4 %
Ride Performance	142	8 %	146	8 %
Aftermarket	(30)	(2)%	(1)	— %
Powertrain	1,112	n/m	1,112	n/m
Motorparts	774	n/m	774	n/m
Total Tenneco Inc.	$2,489	27 %	$ 2,178	31 %

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Light Vehicle Industry Production by Region for Years Ended December 31, 2018 and 2017 (According to IHS Markit, February 2019)

	Year Ended December 31			
	2018	2017	Increase (Decrease)	% Increase (Decrease)
	(Number of Vehicles in Thousands)			
North America	16,952	17,064	(112)	(1)%
Europe	21,971	22,216	(245)	(1)%
South America	3,394	3,291	103	3%
China	26,608	27,726	(1,118)	(4)%
India	4,720	4,459	261	6%

Segment Revenue

Clean Air revenue was up $491 million to $6,707 million in 2018 compared to $6,216 million in 2017. Higher volumes drove a $486 million increase due to higher light vehicle revenues, higher commercial truck, off-highway and other vehicle sales, as well as new platforms, partially offset by price reductions and the negative impact of the end of OE customer production in Australia. Currency had a $45 million favorable impact on Clean Air revenues.

Ride Performance revenue was up $142 million to $1,949 million in 2018 compared to $1,807 million in 2017. Higher volumes drove a $138 million increase due to increased light vehicle and commercial truck, off-highway and other vehicle sales and new platforms. Currency had a $4 million unfavorable impact on Ride Performance revenues.

Aftermarket revenue was down $30 million to $1,221 million in 2018 compared to $1,251 million in 2017 due to lower volumes and unfavorable mix, partially offset by favorable pricing. Currency had a $29 million unfavorable impact on Aftermarket revenues.

As a result of the Federal-Mogul Acquisition, Powertrain revenue was $1,112 million and Motorparts revenue was $774 million in 2018.

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Earnings before Interest Expense, Income Taxes, Noncontrolling Interests and Depreciation and Amortization ("EBITDA including noncontrolling interests")

The following table presents the reconciliation from net income attributable to Tenneco Inc. to EBITDA including noncontrolling interests by segment:

	Year Ended December 31		2018 vs 2017 Change	2018 EBITDA including noncontrolling interest as a % of Revenues	2017 EBITDA including noncontrolling interest as a % of Revenues
	2018	2017			
	(Millions)				
EBITDA including noncontrolling interests by Segments:					
Clean Air	$ 597	$ 562	$ 35	9 %	9 %
Ride Performance	66	124	(58)	3 %	7 %
Aftermarket	169	193	(24)	14 %	15 %
Powertrain	92	—	92	8 %	
Motorparts	(39)	—	(39)	(5)%	
Other	(234)	(245)	11		
Total EBITDA including noncontrolling interests	651	634	$ 17	6 %	7 %
Depreciation and amortization	(345)	(226)			
Earnings before interest expense, income taxes, and noncontrolling interests	306	408			
Less: Interest expense	132	72			
Less: Income tax expense (benefit)	63	71			
Net income	111	265			
Net Income attributable to noncontrolling interests	56	67			
Net income attributable to Tenneco Inc.	$ 55	$ 198			

Revenue by Segments:							
Clean Air	$ 6,707	$ 6,216					
Ride Performance	1,949	1,807					
Aftermarket	1,221	1,251					
Powertrain	1,112	—					
Motorparts	774	—					
Total	$ 11,763	$ 9,274					
Other data							
EBITDA including noncontrolling interests (1)	$ 651	$ 634	17	6	%	7	%

(1) As a result of the Federal-Mogul Acquisition, we changed our key performance measure. We now use EBITDA including noncontrolling interests as the key performance measure in our financial and operational decision making processes, for internal reporting, and for planning and forecasting purposes to effectively allocate resources. EBITDA including noncontrolling interests is defined as earnings before interest expense, income taxes, noncontrolling interests, and depreciation and amortization. Prior period results have been retrospectively recast to reflect the change in our key performance measure. This non-GAAP measure is accompanied by a reconciliation to the comparable US GAAP measure, net income, in the table above. EBITDA including noncontrolling interests should not be considered a substitute for results prepared in accordance with US GAAP and should not be considered an alternative to net income. EBITDA including noncontrolling interests, as determined and measured by us, should not be compared to similarly titled measures reported by other companies.

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The EBITDA including noncontrolling interests results shown in the preceding table include the following items, certain of which are discussed below under “Adjustments,” which may have an effect on the comparability of EBITDA including noncontrolling interests results between periods:

	Reportable Segments							
	Clean Air	Ride Performance	Aftermarket	Powertrain	Motorparts	Total	Other	Total
	(Millions)							
Year Ended December 31, 2018								
Adjustments:								
Costs to achieve synergies [1]:								
Restructuring related to synergy initiatives	$3	$ 5	$ 9	$ —	$ 31	$48	$7	$55
Other cost to achieve synergies	—	1	1	—	—	2	5	7
Total costs to achieve synergies	3	6	10	—	31	50	12	62
Restructuring and related expenses:								
Other restructuring charges	11	43	7	(2)	—	59	(2)	57
Asset impairments	—	3	—	—	—	3	2	5
Total restructuring and related expenses	11	46	7	(2)	—	62	—	62
Cost reduction initiatives [2]	—	10	—	—	—	10	8	18
Warranty charge [3]	—	5	—	—	—	5	—	5
Litigation settlement accrual	—	9	—	—	—	9	1	10
Acquisition and expected spin costs [4]	—	—	—	—	—	—	96	96
Loss on extinguishment of debt [5]	—	—	—	—	—	—	10	10
Environmental charge [6]	—	—	—	—	—	—	4	4
Anti-dumping duty charge [7]	—	—	—	—	16	16	—	16
Pension charges [8]	—	3	—	—	—	3	—	3
Purchase accounting adjustments [9]	—	—	—	44	62	106	—	106
Goodwill impairment charge [10]	—	3	—	—	—	3	—	3
Total adjustments	$14	$ 82	$ 17	$ 42	$ 109	$264	$131	$395
Year Ended December 31, 2017								
Adjustments:								
Restructuring and related expenses	$23	$ 16	$ 7	$ —	$ —	$46	$1	$47
Cost reduction initiatives [2]	4	12	3	—	—	19	3	22
Loss on extinguishment of debt [5]	—	—	—	—	—	—	1	1
Warranty settlement [11]	—	7	—	—	—	7	—	7
Goodwill impairment charge [10]	—	7	4	—	—	11	—	11
Pension charges/ stock vesting charges [12]	—	—	—	—	—	—	13	13
Antitrust settlement accrual [13]	—	—	—	—	—	—	132	132
Gain on sale of unconsolidated JV	—	—	—	—	—	—	(5)	(5)
Total adjustments	$27	$ 42	$ 14	$ —	$ —	$83	$145	$228

(1) Costs to achieve synergies related to the Acquisition.
(2) Costs related to cost reduction initiatives and related incentive and retention bonus programs.
(3) Charge related to warranty. Although we regularly incur warranty costs, this specific charge was of an unusual nature in the period incurred.

(4) Costs related to the Acquisition and expected spin.
(5) Loss on extinguishment of debt as a result of the refinancing of the revolving credit loan and tranche A term loan as a result of the Federal-Mogul Acquisition. See Note 11, Debt and Other Financing Arrangements for additional information.
(6) Environmental charge related to a site whereby an indemnification reverted back to the Company resulting from a 2009 bankruptcy filing of Mark IV Industries.
(7) Charges due to retroactive application of anti-dumping duty on a supplier's products.
(8) Charges related to curtailments and settlements of our pension and other postretirement benefit plans in connection with our restructuring initiatives.

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(9) This primarily relates to a non-cash charge to cost of goods sold for the amortization of the inventory fair value step-up recorded as part of the Federal-Mogul Acquisition.
(10) Non-cash asset impairment charge related to goodwill.
(11) Warranty settlement with customer.
(12) Charges related to pension derisking and the acceleration of restricted stock vesting in accordance with the long-term incentive plan.
(13) Charges related to establishing a reserve for settlement costs necessary to resolve the Company's antitrust matters globally.

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

Consolidated Results of Operations

The following table presents our consolidated results of operations and reflects the revisions as discussed in Item 8 — Note 2, Summary of Significant Accounting Policies:

	Year Ended December 31		Increase / (Decrease)	
	2017	2016	$ Change	% Change
	(Millions Except Percent, Share and Per Share Amounts)			
Revenues				
Net sales and operating revenues	$9,274	$ 8,597	$677	8 %
Costs and expenses				
Cost of sales (exclusive of depreciation and amortization)	7,812	7,126	686	10 %
Selling, general, and administrative	638	514	124	24 %
Depreciation and amortization	226	213	13	6 %
Engineering, research, and development	158	153	5	3 %
Goodwill impairment charge	11	—	11	n/m
	8,845	8,006	839	10 %
Other expense (income)				
Loss on sale of receivables	5	5	—	— %
Non-service pension and postretirement benefit costs	16	84	(68)	(81)%
Loss on extinguishment of debt	1	24	(23)	(96)%
Equity in losses of nonconsolidated affiliates	1	—	1	— %
Other expense (income), net	(2)	(1)	(1)	100 %
	21	112	(91)	(81)%
Earnings before interest expense, income taxes, and noncontrolling interests	408	479	(71)	(15)%
Interest expense	72	68	4	6 %
Earnings before income taxes and noncontrolling interests	336	411	(75)	(18)%
Income tax expense (benefit)	71	(4)	75	n/m
Net income	265	415	(150)	(36)%
Less: Net income attributable to noncontrolling interests	67	68	(1)	(1)%
Net income attributable to Tenneco Inc.	$198	$ 347	$(149)	(43)%
Earnings per share				
Weighted average shares of common stock outstanding —				
Basic	52,796,184	55,939,135	(3,142,951)	(6)%
Diluted	53,026,911	56,407,436	(3,380,525)	(6)%
Basic earnings per share of common stock	$3.75	$ 6.20	$(2.45)	(40)%
Diluted earnings per share of common stock	$3.73	$ 6.15	$(2.42)	(39)%
Cash dividends declared per share	$1.00	$ —	$1.00	— %
Percent of revenues				
Cost of sales	84 %	83 %	1 %	
Selling, general, and administrative	7 %	6 %	1 %	
EBIT	4 %	6 %	(2)%	
Net income attributable to Tenneco Inc.	2 %	4 %	(2)%	

(1) Percentages above denoted as "n/m" are not meaningful to present in the table.

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Revenues

Total revenue for 2017 was $9,274 million, up 8% from $8,597 million in 2016, on strong global light vehicle and commercial truck, off-highway and other vehicle revenues, driven by the Clean Air and Ride Performance product lines. Excluding the impact of currency and substrate sales, revenue was up $449 million from $6,569 million to $7,018 million. The increase in revenues was driven primarily by stronger OE light vehicle volumes and higher commercial truck, off-highway and other vehicle revenues in all regions as well as new platforms.

The following table lists the primary drivers behind the change in revenues ($ millions).

Year ended December 31, 2016	$8,597
Volume and mix	611
Currency exchange rates	86
Others	(20)
Year ended December 31, 2017	$9,274

Cost of sales

Cost of sales for 2017 was $7,812 million, or 84% of sales, compared to $7,126 million, or 83% of sales in 2016. The following table lists the primary drivers behind the change in cost of sales ($ millions).

Year ended December 31, 2016	$7,126
Volume and mix	553
Material	29
Currency exchange rates	75
Restructuring	25
Other costs	4
Year ended December 31, 2017	$7,812

The increase in cost of sales was mainly due to the year-over-year increase in volume, higher net material costs, higher other costs, mainly manufacturing, higher restructuring costs and the impact of currency exchange rates. Also refer to section below "Restructuring charges."

Selling, general and administrative (SG&A)

SG&A was up $124 million in 2017, at $638 million, compared to $514 million in 2016. Included in 2017 was $132 million antitrust settlement accrual. Also refer to section below "Restructuring charges."

Depreciation and amortization

Depreciation and amortization expense was $226 million and $213 million for 2017 and 2016, respectively.

Engineering, research, and development

Engineering, research, and development expense was $158 million and $153 million in 2017 and 2016, respectively. Also refer to section below "Restructuring charges."

Goodwill impairment charge

As a result of our goodwill impairment assessment in the fourth quarter of 2017, we determined the estimated fair value of the Europe and South America Ride Performance and Aftermarket reporting unit was lower than its carrying value. Accordingly, we recorded a goodwill impairment charge of $11 million in the fourth quarter of 2017.

Non-service pension and postretirement benefit costs

Non-service pension and postretirement benefit costs was down $68 million in 2017 at $16 million compared to $84 million at 2016. Included in 2016 were $72 million in pension buyout charges.

Loss on extinguishment of debt

Loss on extinguishment of debt was $1 million in 2017, as compared to $24 million in 2016.

Interest Expense, Net of Interest Capitalized

We reported interest expense in 2017 of $72 million (substantially all in our U.S. operations) net of interest capitalized of $8 million, and $68 million (substantially all in our U.S. operations) net of interest capitalized of $6 million in 2016.

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Income Taxes

We reported income tax expense of $71 million on earnings before income taxes and noncontrolling interests of $336 million in 2017, as compared to an income tax benefit of $4 million in earnings before income taxes and noncontrolling interests of $411 million in 2016. The tax expense recorded in 2017 included a tax benefit of $12 million primarily relating to valuation allowance releases, a provisional amount of $43 million for a one-time transition tax on deemed repatriation of previously deferred foreign earnings under the Tax Cuts and Jobs Act. We remeasured U.S. deferred taxes from an applicable federal rate of 35% to the new statutory rate of 21% at which they are expected to be utilized, recording a $46 million provisional expense. The tax expense recorded in 2017 included a net tax benefit of $74 million relating to recognizing a U.S. tax benefit for foreign taxes. In addition, the 2017 tax expense included a $50 million tax benefit related to an antitrust settlement accrual. We reported an income tax benefit of $4 million in 2016. The tax benefit recorded in 2016 included a net tax benefit of $110 million primarily relating to recognizing a U.S. tax benefit for foreign taxes.

Net Income

Net income was $265 million for 2017 as compared to $415 million for 2016, a decrease of 150 million, as result of the aforementioned items.

EBITDA including noncontrolling interests

EBITDA including noncontrolling interests was $634 million for 2017, a decrease of $58 million, when compared to $692 million in 2016 as a result of the aforementioned items. See “Segment Results of Operations” for further information on EBITDA including noncontrolling interests.

Restructuring Charges

The classification of our restructuring charges in the consolidated statements of income is as follows:

	Year Ended December 31	
	2017	2016
	(Millions)	
Cost of sales	$ 41	$ 17
Engineering, research, and development	—	1
Selling, general, and administrative	6	12
	$ 47	$ 30

See to Item 8 — Note 4, Restructuring Charges and Asset Impairments, Net for further information of restructuring initiatives.

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Segment Results of Operations

Revenues

The following tables reflect our revenues for the years of 2017 and 2016. See "Overview of Net Sales and Operating Revenues" for a description of why we present these reconciliations of revenue. We have not reflected any currency impact in the 2016 table since this is the base period for measuring the effects of currency during 2017 on our operations. Revenues in 2017 have been adjusted to reflect a consistent currency exchange rate with 2016.

	Year Ended December 31, 2017					Year Ended December 31, 2016		
	Revenues	Substrate Sales	Value-add Revenues	Currency Impact on Value-add Revenues	Value-add Revenues excluding Currency	Revenues	Substrate Sales	Value-add Revenues
	(Millions)					(Millions)		
Clean Air	$6,216	$ 2,187	$ 4,029	$ 32	$ 3,997	$5,764	$ 2,028	$ 3,736
Ride Performance	1,807	—	1,807	27	1,780	1,593	—	1,593
Aftermarket	1,251	—	1,251	10	1,241	1,240	—	1,240
Total Tenneco Inc.	$9,274	$ 2,187	$ 7,087	$ 69	$ 7,018	$8,597	$ 2,028	$ 6,569

	Year Ended December 31, 2017 Versus Year Ended December 31, 2016 Dollar and Percent Increase (Decrease)			
	Revenues	Percent	Value-add Revenues excluding Currency	Percent
	(Millions Except Percent Amounts)			
Clean Air	$452	8 %	$ 261	7 %
Ride Performance	214	13 %	187	12 %
Aftermarket	11	1 %	1	— %
Total Tenneco Inc.	$677	8 %	$ 449	7 %

Light Vehicle Industry Production by Region for Years Ended December 31, 2017 and 2016 (Updated according to IHS Markit, February 2019)

	Year Ended December 31			
	2017	2016	Increase (Decrease)	% Increase (Decrease)
	(Number of Vehicles in Thousands)			
North America	17,064	17,837	(773)	(4)%
Europe	22,216	21,540	676	3 %
South America	3,291	2,737	554	20 %
China	27,726	27,064	662	2 %
India	4,459	4,175	284	7 %

Segment Revenue

Clean Air revenue was up $452 million to $6,216 million in 2017 compared to $5,764 million in 2016. Higher volumes drove a $432 million increase due to higher light vehicle, commercial truck, off-highway and other vehicle sales as well as new platforms, partially offset by unfavorable pricing and mix. Currency had a $49 million favorable impact on Clean Air revenues.

Ride Performance revenue was up $214 million to $1,807 million in 2017 compared to $1,593 million in 2016. Higher volumes drove a $192 million increase due to higher light vehicle, commercial truck, off-highway and other vehicle sales as well as new platforms. Currency had a $27 million favorable impact on Ride Performance revenues.

Aftermarket revenue was up $11 million to $1,251 million in 2017 compared to $1,240 million in 2016. Lower volumes drove a $30 million decrease, which was more than offset by favorable mix and pricing and a $10 million favorable currency impact.

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Earnings before Interest Expense, Income Taxes, Noncontrolling Interests and Depreciation and Amortization ("EBITDA including noncontrolling interests")

The following table presents the reconciliation from net income attributable to Tenneco Inc. to EBITDA including noncontrolling interests by segments:

	Year Ended December 31			2017 EBITDA including noncontrolling interest as a % of Revenues	2016 EBITDA including noncontrolling interest as a % of Revenues
	2017	2016	2017 vs 2016 Change		
	(Millions)				
EBITDA including noncontrolling interests by Segments:					
Clean Air	$562	$561	$ 1	9 %	10 %
Ride Performance	124	153	(29)	7 %	10 %
Aftermarket	193	207	(14)	15 %	17 %
Other	(245)	(229)	(16)		
Total EBITDA including noncontrolling interests	634	692	$ (58)	7 %	8 %
Depreciation and amortization	(226)	(213)			
Earnings before interest expense, income taxes, and noncontrolling interests	408	479			
Less: Interest expense	72	68			
Less: Income tax expense (benefit)	71	(4)			
Net income	265	415			
Net Income attributable to noncontrolling interests	67	68			
Net income attributable to Tenneco Inc.	$198	$347			
Revenue by Segments:					
Clean Air	$6,216	$5,764			
Ride Performance	1,807	1,593			
Aftermarket	1,251	1,240			
Total	$9,274	$8,597			
Other data					
EBITDA including noncontrolling interests (1)	$634	$692	$ (58)	7 %	8 %

(1) As a result of the Federal-Mogul Acquisition, we changed our key performance measure. We now use EBITDA including noncontrolling interests as the key performance measure in our financial and operational decision making processes, for internal reporting, and for planning and forecasting purposes to effectively allocate resources. EBITDA including noncontrolling interests is defined as earnings before interest expense, income taxes, noncontrolling interests, and depreciation and amortization. Prior period results have been retrospectively recast to reflect the change in our key performance measure. This non-GAAP measure is accompanied by a reconciliation to the comparable US GAAP measure, net income, in the table above. EBITDA including noncontrolling interests should not be considered a substitute for results prepared in accordance with US GAAP and should not be considered an alternative to net income. EBITDA including noncontrolling interests, as determined and measured by us, should not be compared to similarly titled measures reported by other companies.

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The EBITDA including noncontrolling interests results shown in the preceding table include the following items, certain of which are discussed below under "Adjustments," which may have an effect on the comparability of EBITDA including noncontrolling interests results between periods:

	Reportable Segments					
	Clean Air	Ride Performance	Aftermarket	Total	Other	Total
	(Millions)					
Year Ended December 31, 2017						
Adjustments:						
Restructuring charges	$23	$ 16	$ 7	$ 46	$1	$47
Cost reduction initiatives (1)	4	12	3	19	3	22
Loss on extinguishment of debt (2)	—	—	—	—	1	1
Warranty settlement (3)	—	7	—	7	—	7
Goodwill impairment charge (4)	—	7	4	11	—	11
Pension charges/ stock vesting charges (5)	—	—	—	—	13	13
Antitrust settlement accrual (6)	—	—	—	—	132	132
Gain on sale of unconsolidated JV	—	—	—	—	(5)	(5)
Total adjustments	$27	$ 42	$ 14	$ 83	$145	$228
Year Ended December 31, 2016						
Adjustments:						
Restructuring charges						
Other restructuring charges	$6	$ 13	$ 9	$ 28	$2	$30
Asset impairments	—	2	—	2	—	2
Total restructuring and related expenses	6	15	9	30	2	32
Pension charges/ stock vesting charges (5)	—	—	—	—	72	72
Total adjustments	$6	$ 15	$ 9	$ 30	$74	$104

(1) Costs related to cost reduction initiatives and related incentive and retention bonus programs.
(2) Loss on extinguishment of debt. See Note 11, Debt and Other Financing Arrangements for additional information.
(3) Warranty settlement with a customer.
(4) Non-cash asset impairment charge related to goodwill.
(5) Charges related to pension derisking and the acceleration of restricted stock vesting in accordance with the long-term incentive plan.
(6) Charges related to establishing a reserve for settlement costs necessary to resolve the Company's antitrust matters globally.

LIQUIDITY AND CAPITAL RESOURCES

Capitalization

	Year Ended December 31		% Change
	2018	2017	
	(Millions)		
Short-term debt and maturities classified as current	$153	$103	49 %
Long-term debt	5,340	1,358	293 %

Total debt	5,493	1,461	276	%
Total redeemable noncontrolling interests	138	42	229	%
Total noncontrolling interests	190	46	313	%
Tenneco Inc. shareholders’ equity	1,726	636	171	%
Total equity	1,916	682	181	%
Total capitalization	$7,547	$2,185	245	%

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Short-term debt, which includes maturities classified as current, borrowings by the parent company and foreign subsidiaries, and borrowings under our accounts receivable securitization programs, were $153 million and $103 million as of December 31, 2018 and December 31, 2017. We had no borrowings under our revolving credit facilities, which are classified as long-term debt, at December 31, 2018 and were $244 million at December 31, 2017.

The 2018 year-to-date increase in our shareholders' equity primarily resulted from net income attributable to Tenneco Inc. of $55 million, an increase of $143 million in noncontrolling interest equity resulting from the Federal-Mogul Acquisition, and a $1.2 billion increase in premium on common stock and other capital surplus relating to the new common stock issued for the Federal-Mogul Acquisition, partially offset by a $132 million decrease caused by the effect of changes in foreign exchange rates on the translation of financial statements of our foreign subsidiaries into U.S. dollars and cash dividend payments of $59 million.

Financing Arrangements

The table below shows our borrowing capacity on committed credit facilities as of December 31, 2018:

	Committed Credit Facilities[a] as of December 31, 2018				
	Term	Commitments	Borrowings	Letters of Credit(b)	Available
	(Millions)				
Tenneco Inc. revolving credit agreement	2023	$ 1,500	$ —	$ 24	$ 1,476
Tenneco Inc. Term Loan A	2023	1,700	1,700	—	—
Tenneco Inc. Term Loan B	2025	1,700	1,700	—	—
Subsidiaries' credit agreements	2018-2028	154	51	3	100
		$ 5,054	$ 3,451	$ 27	$ 1,576

(a) We are generally required to pay commitment fees on the unused portion of the total commitment.
(b) Letters of credit reduce the available borrowings under the revolving credit agreement.

New Credit Facility - General

On October 1, 2018, we entered into a new credit agreement with JPMorgan Chase Bank, N.A., as administrative agent and other lenders (the "New Credit Facility") in connection with the acquisition of Federal-Mogul. The New Credit Facility consists of $4.9 billion of total debt financing, consisting of a five-year $1.5 billion revolving credit facility, a five-year $1.7 billion term loan A facility ("Term Loan A") and a seven-year $1.7 billion term loan B facility ("Term Loan B"). Proceeds from the New Credit Facility were used to finance the cash consideration portion of the Acquisition purchase price, to refinance our then existing senior credit facilities, inclusive of the revolver and the tranche term loan A then outstanding (the "Old Credit Facility"), certain senior credit facilities of Federal-Mogul, to pay Acquisition fees and expenses, and the financing thereof. The remainder, including future borrowings under the revolving credit facility, will be used for general corporate purposes.

We and our wholly-owned subsidiary, Tenneco Automotive Operating Company Inc., are borrowers under the New Credit Facility, and we are the sole borrower under the Term Loan A and Term Loan B facilities. The New Credit Facility is guaranteed on a senior basis by certain of our material domestic subsidiaries. Drawings under the revolving credit facility may be in U.S. dollars, British pounds or euros.

The New Credit Facility is secured by substantially all of our domestic assets, our subsidiary guarantors, and by pledges of up to 66% of the stock of certain first-tier foreign subsidiaries. The security for the New Credit Facility will be pari passu with the security for outstanding senior secured notes of Federal-Mogul that we assumed in connection with the Acquisition. If any of our foreign subsidiaries is added to the revolving credit facility as a borrower, the obligations of such foreign borrower will be secured by the assets of such foreign borrower, and also will be secured

by the assets of, and guaranteed by, the domestic borrowers and domestic guarantors as well as certain of our foreign subsidiaries in the chain of ownership of such foreign borrower.

As a result of the refinancing of the revolving credit loan and tranche A term loan under the Old Credit Facility, we recorded a loss on extinguishment of debt of $10 million for the year ended December 31, 2018, primarily consisting of debt issuance costs incurred at the transaction date and write-off of deferred debt issuance costs related to the refinanced revolving credit loan and tranche A term loan. We also recorded $1 million of loss on extinguishment of debt for the year ended December 31, 2017 related to amendment and restatement of the Old Credit Facility and the write off of deferred debt issuance costs related to the Old Credit Facility.

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New Credit Facility - Interest Rates and Fees
The interest rate on borrowings under the revolving credit facility and the term loan A facility will initially be LIBOR plus 1.75%, which interest rate will be subject to change if our consolidated net leverage ratio changes. Initially, and so long as our corporate family rating is Ba3 (with a stable outlook) or higher from Moody's Investors Service, Inc. ("Moody's") and BB- (with a stable outlook) or higher from Standard & Poor's Financial Services LLC ("S&P"), the interest rate on borrowings under the term loan B facility will be LIBOR plus 2.75%; at any time the foregoing conditions are not satisfied, the interest rate on the term loan B facility will be LIBOR plus 3.00%. When the term loan B facility is no longer outstanding and we and our subsidiaries have no other secured indebtedness (with certain exceptions set forth in the New Credit Facility), and upon our achieving and maintaining two or more corporate credit and/or corporate family ratings higher than or equal to BBB- from S&P, BBB- from Fitch Ratings Inc. ("Fitch") and/or Baa3 from Moody's (in each case, with a stable or positive outlook), the collateral under the New Credit Facility may be released.

New Credit Facility - Other Terms and Conditions
The New Credit Facility contains representations and warranties, and covenants which are customary for debt facilities of this type. The covenants limit our ability and the ability of our restricted subsidiaries to, among other things, to (i) incur additional indebtedness or issue preferred stock, (ii) pay dividends or make distributions to our stockholders, (iii) purchase or redeem our equity interests, (iv) make investments, (v) create liens on their assets, (vi) enter into transactions with our affiliates, (vii) sell assets and (viii) merge or consolidate with, or dispose of substantially all of our assets to, other companies.

The New Credit Facility includes customary events of default and other provisions that could require all amounts due thereunder to become immediately due and payable, either automatically or at the option of the lenders, if we fail to comply with the terms of the New Credit Facility or if other customary events occur.

The New Credit Facility also contains two financial maintenance covenants for the revolving credit facility and the term loan A facility including (x) a requirement to have a consolidated net leverage ratio (as defined in the New Credit Facility) as of the end of each fiscal quarter of not greater than 4.0 to 1 through September 30, 2019, 3.75 to 1 through September 30, 2020 and 3.5 to 1 thereafter; and (y) a requirement to maintain consolidated interest coverage ratio (as defined in the New Credit Facility) for any period of four consecutive fiscal quarters of not less than 2.75 to 1.

The financial ratios required under the New Credit Facility and the actual ratios we calculated as of December 31, 2018 for the fourth quarter of 2018, are as follows: leverage ratio of 2.74 actual versus 4.00 (maximum) required; and interest coverage ratio of 6.50 actual versus 2.75 (minimum) required.

The covenants in our New Credit Facility generally prohibit us from repaying or refinancing our senior unsecured notes. So long as no default exists, we would, however, under our New Credit Facility, be permitted to repay or refinance our senior unsecured notes (i) with the net cash proceeds of permitted refinancing indebtedness (as defined in the New Credit Facility); (ii) in an amount equal to the net cash proceeds of qualified capital stock (as defined in the New Credit Facility) issued after October 1, 2018 and (iii) in exchange for qualified capital stock issued after October 1, 2018; and (iv) with additional payments provided that such additional payments are capped as follows based on a pro forma consolidated leverage ratio after giving effect to such additional payments:

Pro forma Consolidated Leverage Ratio	Prior to Spin-Off (Millions)	Post Spin-Off
Greater than or equal to 2.25x	$ 360	$360 x Post Spin-Off EBITDA/Pre Spin-Off EBITDA

Less than 2.25x	unlimited	unlimited

Although the New Credit Facility agreement would permit us to repay or refinance our senior notes under the conditions described above, any repayment or refinancing of our outstanding notes would be subject to market conditions and either the voluntary participation of note holders or our ability to redeem the notes under the terms of the applicable note indenture. For example, while the New Credit Facility agreement would allow us to repay our outstanding notes via a direct exchange of the notes for either permitted refinancing indebtedness or for shares of our common stock, we do not, under the terms of the agreements governing our outstanding notes, have the right to refinance the notes via any type of direct exchange.

The New Credit Facility agreement also contains other restrictions on our operations that are customary for similar facilities, including limitations on: (i) incurring additional liens; (ii) sale and leaseback transactions (except for the permitted transactions as described in the New Credit Facility agreement); (iii) liquidations and dissolutions; (iv) incurring additional indebtedness or guarantees; (v) investments and acquisitions; (vi) dividends and share repurchases; (vii) mergers and consolidations; and

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(viii) refinancing of the senior notes. Compliance with these requirements and restrictions is a condition for any incremental borrowings under the New Credit Facility agreement and failure to meet these requirements enables the lenders to require repayment of any outstanding loans.

As of December 31, 2018, we were in compliance with all the financial covenants and operational restrictions of the New Credit Facility.

Senior Notes

A summary of our senior unsecured and secured notes as of December 31, 2018 are as follows:

	2018		
	Principal	Carrying Amount(1)	Effective Interest Rate
Senior Unsecured Notes		(Millions)	
$225 million of 5.375% Senior Notes due 2024	$225	$ 222	5.609 %
$500 million of 5.000% Senior Notes due 2026	$500	$ 493	5.219 %
Senior Secured Notes			
€415 million 4.875% Euro Fixed Rate Notes due 2022	$476	$ 496	3.599 %
€300 million of Euribor plus 4.875% Euro Floating Rate Notes due 2024	$344	$ 349	4.620 %
€350 million of 5.000% Euro Fixed Rate Notes due 2024	$401	$ 427	3.823 %

(1) Carrying amount is net of unamortized debt issuance costs and debt discounts or premiums. Total unamortized debt issuance costs were $90 million as of December 31, 2018. Total unamortized debt (premium) discount, net was $(49) million as of December 31, 2018.

Senior Unsecured Notes

Our outstanding 5.375% senior notes due December 15, 2024 ("2024 Senior Notes") and 5% senior notes due July 15, 2026 ("2026 Senior Notes" and together with the 2024 Senior Notes, the "Senior Unsecured Notes") at December 31, 2018. We are permitted to redeem some or all of the outstanding Senior Unsecured Notes, at specified redemption prices that decline to par over a specified period, at any time (a) on or after December 15, 2019, in the case of the 2024 Senior Notes and (b) on or after July 15, 2021, in the case of the 2026 Senior Notes. In addition, the Senior Unsecured Notes may also be redeemed at a price generally equal to 100% of the principal amount thereof plus a premium based on the present values of the remaining payments due to the note holders. Further, we may redeem up to 35% of each Senior Unsecured Notes with the proceeds of certain equity offerings on or before July 15, 2019 at a redemption price equal to 105%, in the case of the 2026 Senior Notes.

If we experience specified kinds of changes in control, we must offer to repurchase the Senior Unsecured Notes at 101% of the principal amount thereof plus accrued and unpaid interest. In addition, if we sell certain of our assets and do not apply the proceeds from the sale in a certain manner within 365 days of the sale, we must offer to repurchase the 2024 Senior Unsecured Notes at 100% of the principal amount thereof plus accrued and unpaid interest.

Senior Secured Notes

In connection with the Acquisition of Federal-Mogul on October 1, 2018, we assumed an aggregate principal amount of €350 million ($401 million) 5.000% euro denominated fixed rate notes which are due July 15, 2024 ("5.000% Euro Fixed Rate Notes"), an aggregate principle amount of €415 million ($476 million) 4.875% euro denominated fixed rate notes due April 15, 2022 ("4.875% Euro Fixed Rate Notes"), and aggregate principal amount of €300 million ($344 million) floating rate notes due April 15, 2024 ("Euro Floating Rate Notes", and together with the 5.000% Euro Fixed Rate Notes and the 4.875% Euro Fixed Rate Notes, the "Senior Unsecured Notes"). The Senior Secured Notes will

rank equally in right of payment to all our indebtedness under our New Credit Facility.

We are permitted to redeem some or all of the outstanding Senior Secured Notes at specified redemption prices that decline to par over a specified period, at any time (a) on or after July 15, 2020, in the case of the 5.000% Euro Fixed Rate Notes, (b) on or after April 15, 2019, in the case of the 4.875% Euro Fixed Rate Notes and (c) on or after April 15, 2018, in the case of the Euro Floating Rate Notes. In addition, the Senior Secured Notes may also be redeemed at a price generally equal to 100% of the principal amount thereof plus a premium based on the present values of the remaining payments due to the note holders. Further, we may also redeem up to 40% of the 5.000% Euro Fixed Rate Notes and the 4.875% Euro Fixed Rate Notes with the proceeds of certain equity offerings at any time prior to (a) July 15, 2020 at a redemption price of 105.0% in the case of the 5.000% Euro Fixed Rate Notes, and (b) April 15, 2019 at a redemption price of 104.875% in the case of the 4.875% Euro Fixed Rate Notes.

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If we experience specified kinds of changes in control, we must offer to repurchase the Senior Secured Notes at 101% of the principal amount thereof plus accrued and unpaid interest. In addition, if we sell certain of our assets and do not apply the proceeds from the sale in a certain manner within 365 days of the sale, we must offer to repurchase the Senior Secured Notes at 100% of the principal amount thereof plus accrued and unpaid interest.

We have designated a portion of the Senior Secured Notes as a net investment hedge of our European operations. As such, the fluctuations in foreign currency exchange rates on the value of the notes is recorded to cumulative translation adjustment. See Note 9, Derivatives and Hedging Activities for further details.

Senior Unsecured Notes and Senior Secured Notes - Other Terms and Conditions
Our Senior Notes contain covenants that will, among other things, limit our ability to create liens and enter into sale and leaseback transactions. Our Senior Secured Notes and 2024 Senior Unsecured Notes also require that, as a condition precedent to incurring certain types of indebtedness not otherwise permitted, our consolidated fixed charge coverage ratio, as calculated on a pro forma basis, be greater than 2.00, as well as containing restrictions on its operations, including limitations on: (i) incurring additional indebtedness; (ii) paying dividends; (iii) distributions and stock repurchases; (iv) investments; (v) asset sales and (vi) mergers and consolidations.

Subject to limited exceptions, all of our existing and future material domestic wholly owned subsidiaries fully and unconditionally guarantee our Senior Unsecured Notes and Senior Secured Notes on a joint and several basis. There are no significant restrictions on the ability of the subsidiaries that have guaranteed these notes to make distributions to us.

As of December 31, 2018, we were in compliance with the covenants and restrictions of these indentures.

Other Debt
We have approximately $106 million of other debt, which consists primarily of foreign debt with maturities of one year or less.

On-Balance Sheet Arrangements
We have securitization programs for some of our accounts receivable, with limited recourse provisions. Borrowings on these securitization programs are recorded in short-term debt.

Borrowings on these securitization programs at December 31, 2018 and 2017 are as follows:

	As of December 31	
	2018	2017
	(Millions)	
Borrowings on securitization programs	$ 6	$ 30

In the U.S., we had an accounts receivable securitization program with three commercial banks, comprised of a first priority facility and a second priority facility, which we terminated in October 2018. We securitized original equipment and aftermarket receivables on a daily basis under this program. Both facilities monetized accounts receivable generated in the U.S. that met certain eligibility requirements and the second priority facility also monetized certain accounts receivable generated in the U.S. that would otherwise have been ineligible under the first priority securitization facility. The amount of outstanding third-party investments in our securitized accounts receivable under this U.S. program was $30 million, recorded in short-term debt, at December 31, 2017.

Off-Balance Sheet Arrangements

On December 14, 2017, we entered into a new accounts receivable factoring program in the U.S. with a commercial bank. Under this program we sell receivables from certain of our U.S. OE customers at a rate that is favorable versus our senior credit facility. This arrangement is uncommitted and provides for cancellation by the commercial bank with no less than 30 days prior written notice. The amount of outstanding third-party investments in our accounts receivable sold under this program was $130 million and $107 million at December 31, 2018 and 2017.

The Company has two other receivable factoring programs in the U.S. with commercial banks under which we sell receivables from certain of our aftermarket customers to whom we have extended payment terms. Both arrangements are uncommitted and may be terminated with 10 days prior notice for one program and 30 days prior notice for the other program. The amount of outstanding third-party investments in our accounts receivable sold under these programs was $387 million at December 31, 2018.

The Company also has subsidiaries in several countries in Europe that are parties to accounts receivable factoring facilities. The commitments for these arrangements are generally for one year, but some may be canceled with notice 90 days prior to renewal. In some instances, the arrangement provides for cancellation by the applicable financial institution at any time upon notification. The amount of outstanding third-party investments in our accounts receivable sold under programs in Europe was $361 million and $218 million at December 31, 2018 and 2017.

These factoring programs provide us with access to cash at costs that are generally favorable to alternative sources of financing, and allow us to reduce borrowings under our revolving credit agreement. If we were not able to factor receivables under either the European or U.S. programs, our borrowings under our revolving credit agreement might increase, although this could be partially mitigated by exercising our right to shorten payment terms with certain of the aftermarket customers whose receivables we sell under the U.S. factoring programs in the event that those factoring programs are terminated.

In the U.S and Canada we participate in supply chain financing programs with certain of our aftermarket customers to whom we have extended payment terms whereby the accounts receivable are satisfied through the early receipt of negotiable financial instruments that are payable at a later date when payments from our customers are due. We sell these financial instruments before their maturity date to various financial institutions at a discount. Such financial instruments sold to financial institutions with outstanding maturity dates totaled $133 million and $81 million at December 31, 2018 and 2017.

If these drafting programs were terminated or the financial institutions that currently participate in these programs were to reduce their purchases of drafts, our borrowings under our revolving credit agreement might increase, although this could be partially mitigated by exercising our right to shorten payment terms with certain of the aftermarket customers whose drafts we sell under the U.S. and Canadian programs in the event that those programs are terminated or otherwise reduced.

The amounts outstanding for these factoring and drafting arrangements as of December 31, 2018 and 2017 are as follows:

	As of December 31	
	2018	2017
	(Millions)	
Accounts receivable outstanding and derecognized	$1,011	$406
Deferred purchase price receivable	$154	$114

Proceeds from the factoring of accounts receivable qualifying as sales and drafting programs, and expenses associated with these arrangements for the years ended December 31, 2018, 2017, and 2016 are as follows:

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Proceeds from factoring qualifying as sales	$3,390	$1,984	$1,770
Loss on sale of receivables	$16	$5	$5

Supply Chain Financing

Certain of our suppliers participate in supply chain financing programs under which they securitize their accounts receivables from us. Financial institutions participate in the supply chain financing program on an uncommitted basis and can cease purchasing receivables or drafts from our suppliers at any time. If the financial institutions did not continue to purchase receivables or drafts from our suppliers under these programs, the participating vendors may have a need to renegotiate their payment terms with us which in turn could cause our borrowings under our revolving credit facility to increase.

Capital Requirements

We believe that cash flows from operations, combined with our cash on hand, subject to any applicable withholding taxes upon repatriation of cash balances from our foreign operations where most of our cash balances are located, and available borrowing capacity described above, assuming that we maintain compliance with the financial covenants and other requirements of our senior credit facility agreement, will be sufficient to meet our future capital requirements, including debt amortization, capital expenditures, pension contributions, and other operational requirements, for the following year. Our ability to meet the financial covenants depends upon a number of operational and economic factors, many of which are beyond our control. In the event that

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we are unable to meet these financial covenants, we would consider several options to meet our cash flow needs. Such actions include additional restructuring initiatives and other cost reductions, sales of assets, reductions to working capital and capital spending, reduction or cessation of our share repurchase and dividend programs, issuance of equity and other alternatives to enhance our financial and operating position. Should we be required to implement any of these actions to meet our cash flow needs, we believe we can do so in a reasonable time frame.

Cash Flows

Operating Activities

As summarized in the table below, net cash provided by operating activities for the years ended December 31, 2018, 2017, and 2016 were as follows:

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Operational cash flow before changes in operating assets and liabilities	$449	$507	$596
Changes in operating assets and liabilities:			
Receivables	(190)	(81)	(325)
Inventories	27	(94)	(55)
Payables and accrued expenses	291	136	140
Accrued interest and income taxes	(19)	1	13
Other assets and liabilities	(119)	48	5
Total change in operating assets and liabilities	(10)	10	(222)
Net cash provided by operating activities	$439	$517	$374

Cash provided by operations for the year ended December 31, 2018 decreased by $78 million compared to the year ended December 31, 2017. The net decrease was primarily the result of:

- cash flows provided by the operations of Federal-Mogul, which was acquired in the fourth quarter, of approximately $234 million, this included a cash outflow of $61 million related to the settlement of a litigation matter that was assumed as part of the Federal-Mogul Acquisition (see Note 3, Acquisitions and Divestitures for further information);
- offset by a $88 million outflow in working capital items (excluding changes in working capital of the acquired Federal-Mogul operations);
- an increase in cash payments for interest of $36 million; and
- other one-time charges of approximately $180 million, including, among other items, transactional related costs and advisory fees in connection with the Federal-Mogul Acquisition, and an antitrust settlement payment.

Cash provided by operations for the year ended December 31, 2017 increased by $143 million compared to the year ended December 31, 2016. The net increase was primarily the result of:

- increase in cash provided by working capital of $201 million; and
- decrease in cash taxes paid of $18 million.

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Investing Activities

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Federal-Mogul acquisition, net of cash acquired	$(2,194)	$—	$—
Proceeds from sale of assets	9	8	6
Proceeds from sale of equity interest	—	9	—
Cash payments for plant, property, and equipment	(507)	(419)	(345)
Proceeds from deferred purchase price of factored receivables	174	112	110
Other	4	(10)	—
Net cash used by investing activities	$(2,514)	$(300)	$(229)

In 2018, cash used for the Federal-Mogul Acquisition, net of cash acquired, was $2,194 million. See “Note 3, Acquisitions and Divestitures” for additional details.

Capital expenditures were $507 million, $419 million, and $345 million for the years ended December 31, 2018, 2017, and 2016. These capital expenditures were primarily related to investing in new facilities, upgrading existing products, continuing new product launches, and infrastructure and equipment at our facilities (including investments in software-related intangible assets) to support our manufacturing, distribution, and cost reduction efforts. For 2019, we expect our capital expenditures to be between $730 million and $780 million, depending on timing of expenditures, as we continue to invest in our strategic priorities and growth.

Proceeds from deferred purchase price of factored receivables was $174 million, $112 million, and $110 million for the years ended December 31, 2018, 2017, and 2016. This increase in 2018 as compared to 2017 is primarily attributable to the Federal-Mogul Acquisition.

Financing Activities

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Proceeds from term loans and notes	$3,426	$160	$529
Repayments of term loans and notes	(453)	(36)	(545)
Borrowings on revolving lines of credit	5,149	6,664	5,417
Payments on revolving lines of credit	(5,405)	(6,737)	(5,221)
Issuance (repurchase) of common shares	(1)	(1)	13
Cash dividends	(59)	(53)	—
Debt issuance cost of long-term debt	(95)	(8)	(9)
Purchase of common stock under the share repurchase program	—	(169)	(225)
Net increase (decrease) in bank overdrafts	(5)	(7)	10
Other	(30)	—	—
Distributions to noncontrolling interest partners	(51)	(64)	(55)
Net cash provided (used) by financing activities	$2,476	$(251)	$(86)

Cash flow from financing activities was $2,476 million for the year ended December 31, 2018. On October 1, 2018, we issued an aggregate principal amount of $3,400 million as a part of our New Credit Facility entered into in

conjunction with the Federal-Mogul Acquisition. As a part of this New Credit facility we refinanced the revolving credit agreement and tranche A term loan under the Old Credit facility. In 2018, we paid a dividend of $0.25 per share in each quarter, or $59 million in the aggregate. We also had distributions to noncontrolling interest partners of $51 million.

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Cash flow used in financing activities was $251 million for the year ended December 31, 2017. This included borrowings under term loans of $160 million, repayments of term loans of $36 million, and net repayments under revolving lines of credit of $73 million. We also had distributions to noncontrolling interest partners of $64 million.

Cash flow used in financing activities was $86 million for the year ended December 31, 2016. This included $529 million borrowings under term loans and $545 million repayment of terms loans. We also had distributions to noncontrolling interest partners of $55 million.

We did not repurchase any shares during 2018. During 2017, we repurchased 2,936,950 shares of our outstanding common stock for $169 million at an average price of $57.57 per share. During 2016, we repurchased 4,182,613 shares of our outstanding common stock for $225 million at an average price of $53.89 per share. Since announcing our share repurchase program in 2015, we have repurchased a total of approximately 11.3 million shares for $607 million, representing 19% of the shares outstanding at that time. In February 2017, the Board authorized the repurchase of up to $400 million of common stock over the next three years. This amount includes the remaining $112 million amount authorized under earlier repurchase programs. As of December 31, 2018, we had $231 million remaining on the share repurchase authorization. Borrowings under our revolving credit facility were $0 million at December 31, 2018 and $244 million at December 31, 2017. There was $0 million borrowed under the U.S. accounts receivable securitization programs at both the period ending December 31, 2018 and December 31, 2017.

Dividends on Common Stock

On February 1, 2017, we announced the reinstatement of a quarterly dividend program. In 2018, we paid dividends of $0.25 per share in each of the quarters, or $59 million in the aggregate. In 2017, we paid dividends of $0.25 per share in each of the quarters, or $53 million in the aggregate. While we currently expect that comparable quarterly cash dividends will continue to be paid in the near future, our dividend program and the payment of future cash dividends under the program are subject to continued capital availability, the judgment of our Board of Directors and our continued compliance with the provisions pertaining to the payment of dividends under its debt agreements. Once the contemplated separation of our businesses through a spin-off occurs, each independent company will determine its own dividend policy.

Contractual Obligations

Our remaining required debt principal amortization and payment obligations under lease and certain other financial commitments as of December 31, 2018 are shown in the following table:

	Payments due by period:				
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
	(Millions)				
Senior term loans	$3,400	$102	$247	$1,436	$1,615
Senior notes	1,946	—	—	476	1,470
Other long term debt (including maturities classified as current)	106	73	21	10	2
Short-term debt (including bank overdrafts)	80	80	—	—	—
Total debt obligations	5,532	255	268	1,922	3,087
Pension obligations	1,075	96	200	201	578
Operating leases	483	120	186	123	54
Purchase obligations [a]	260	260	—	—	—
Interest payments	1,402	276	578	400	148
Capital commitments	181	181	—	—	—

Total payments	$8,933	$1,188	$1,232	$2,646	$3,867

[(a)] Short-term, ordinary course payment obligations have been excluded.

If we do not maintain compliance with the terms of our New Credit Facility or senior notes indentures described above, all amounts under those arrangements could, automatically or at the option of the lenders or other debt holders, become due. Additionally, each of those facilities contains provisions that certain events of default under one facility will constitute a default under the other facility, allowing the acceleration of all amounts due. We currently expects to maintain compliance with the terms of all of our various credit agreements for the foreseeable future.

Included in our contractual obligations is the amount of interest to be paid on our long-term debt. As our debt structure contains both fixed and variable rate obligations, we have made assumptions in calculating the amount of future interest payments. Interest on our senior notes is calculated using the fixed rates of 5.375% and 5%, respectively. Interest on our variable rate debt is calculated as LIBOR plus the applicable margin in effect at December 31, 2018 for the Eurodollar and Term Loan A loan and prime plus the applicable margin in effect on December 31, 2018 on the prime-based loans. We have assumed that both LIBOR and the prime rate will remain unchanged for the outlying years. See "— Capitalization."

We have also included an estimate of expenditures required after December 31, 2018 to complete the projects authorized at December 31, 2018, in which we have made substantial commitments in connection with purchasing property, plant and equipment for our operations. For 2019, we expect our capital expenditures to be between $730 million and $780 million.

We have included an estimate of the expenditures necessary after December 31, 2018 to satisfy purchase requirements pursuant to certain ordinary course supply agreements that we have entered into. With respect to our other supply agreements, they generally do not specify the volumes we are required to purchase. In many cases, if any commitment is provided, the agreements state only the minimum percentage of our purchase requirements we must buy from the supplier. As a result, these purchase obligations fluctuate from year-to-year and we are not able to quantify the amount of our future obligations.

We have not included material cash requirements for unrecognized tax benefits or taxes. It is difficult to estimate taxes to be paid as changes in where we generate income can have a significant impact its future tax payments. We have also not included cash requirements for funding pension and postretirement benefit costs. Based upon current estimates, we believe we will be required to make contributions of approximately $97 million to those plans in 2019. Pension and postretirement contributions beyond 2019 will be required but those amounts will vary based upon many factors, including the performance of its pension fund investments during 2019 and future discount rate changes. For additional information relating to the funding of our pension and other postretirement plans, refer to Note 13 of the consolidated financial statements. In addition, we have not included cash requirements for environmental remediation. Based upon current estimates, we believe we will be required to spend approximately $46 million over the next 30 years. However, due to possible modifications in remediation processes and other factors, it is difficult to determine the actual timing of the payments. See "— Environmental and Other Matters."

We occasionally provide guarantees that could require it to make future payments in the event that the third party primary obligor does not make its required payments. The Company is not required to record a liability for any of these guarantees.

Additionally, we have from time to time issued guarantees for the performance of obligations by some of our subsidiaries, and some of our subsidiaries have guaranteed our debt. All of our existing and future material domestic subsidiaries fully and unconditionally guarantee its New Credit Facility and its senior notes on a joint and several basis. The New Credit Facility is also secured by first-priority liens on substantially all our domestic assets and pledges of up to 66% of the stock of certain first-tier foreign subsidiaries. As described above, certain of our senior notes are secured by pledges of stock and assets. See Note 23 of the consolidated financial statements of Tenneco Inc., where the Company presents the Supplemental Guarantor Consolidating Financial Statements.

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CRITICAL ACCOUNTING POLICIES AND ESTIMATES

We prepare our consolidated financial statements in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP"), which requires us to make estimates and assumptions that affect the reported amounts and disclosures in our consolidated financial statements. These estimates are subject to an inherent degree of uncertainty and actual results could differ from our estimates. Our significant accounting policies have been disclosed in Note 2, Summary of Significant Accounting Policies. The following paragraphs include a discussion of some critical areas where estimates are required.

Goodwill and Other Indefinite-Lived Intangible Assets

We review goodwill for impairment annually, during the fourth quarter, or more frequently if events or circumstances indicate goodwill might be impaired. We perform assessments at the reporting unit level. We compare the estimated fair value of our reporting units with goodwill to the carrying value of the reporting unit to determine if a goodwill impairment exists. If the carrying value of our reporting units exceeds the fair value, the goodwill is considered impaired. Our assessment of fair value utilizes a combination of the income approach, market approach, and, in instances where a reporting unit's free cash flows do not support the value of the underlying assets, an asset approach. In our assessment, for reporting units where the free cash flows support the value of the underlying assets, we apply a 75% weighting to the income approach and a 25% weighting to the market approach. Assumptions used in the discounted cash flow analysis that have the most significant effect on the estimated fair value of our reporting units are the weighted average cost of capital and revenue growth-rates.

We have nine reporting units that have goodwill as of December 31, 2018, four of which are as a result of the acquisition of Federal-Mogul. Based on our 2018 annual impairment analysis, each of the five reporting units that have goodwill unrelated to the Federal-Mogul acquisition have at least an excess of 18% between the reporting unit’s fair value and carrying value. Additionally, for the reporting units assessed, sensitivity analyses were completed indicating that a one percent increase in the discount rate, a one percent decrease in the long-term operating margin, or a one percent decrease in the long-term revenue growth rate assumptions would not result in the carrying value exceeding the fair value. Goodwill recorded as a result of our acquisition of Federal-Mogul is based on preliminary estimates and assumptions, as well as other information compiled by us. We will continue to evaluate available information prior to finalization of the amounts and these values may be adjusted in the measurement period.

We will review our trade names and trademarks for impairment annually, during the fourth quarter, or more frequently if events or circumstances indicated the assets might be impaired. We will perform a quantitative assessment of estimating fair values based upon the prospective stream of hypothetical after-tax royalty cost savings discounted at rates that reflect the rates of return appropriate for these intangible assets. The primary, and most sensitive, input utilized in determining fair values of trade names and trademarks is branded product sales. These trademarks and brand names were fair valued as part of our acquisition of Federal-Mogul and are based on preliminary estimates and assumptions, as well as other information compiled by us. While we believe these preliminary estimates provide a reasonable basis for estimating the fair value of these assets, we will continue to evaluate available information prior to finalization of the amounts and these values may be adjusted in the measurement period.

Due to the many variables inherent in estimating fair value and the relative size of the goodwill and indefinite-lived intangible assets, differences in assumptions could have a material effect on the results of our analysis.

Refer to Note 7, Goodwill and Other Intangible Assets in Item 8, "Financial Statements and Supplementary Data" for more information regarding our goodwill and indefinite-lived intangible assets.

Impairment of Long-Lived Assets, Definite-Lived Intangible Assets, and Changes to Expected Useful Lives

We monitor our long-lived and definite-lived intangible assets for impairment indicators on an on-going basis. If impairment indicators exist, we perform the required impairment analysis by comparing the undiscounted cash flows expected to be generated from the long-lived assets to the related net book values. If the net book value exceeds the undiscounted cash flows, an impairment loss is recognized. Even if an impairment charge is not recognized, a reassessment of the useful lives over which depreciation or amortization is being recognized may be appropriate based on our assessment of the recoverability of these assets.

We estimate cash flows and fair value using internal budgets based on recent sales data, independent automotive production volume estimates, and customer commitments. The key factors that affect our estimates are (1) future production estimates; (2) customer preferences and decisions; (3) product pricing; (4) manufacturing and material cost estimates; and (5) product life / business retention. Any differences in actual results from the estimates could result in fair values different from the estimated fair values, which could materially affect our future results of operations and financial condition. We believe the projections of

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anticipated future cash flows and fair value assumptions are reasonable; however, changes in assumptions underlying these estimates could affect our valuations.

Pension and Other Postretirement Benefits

The Company sponsors defined benefit pension and postretirement benefit plans for certain employees and retirees around the world. Its defined benefit plans are accounted for on an actuarial basis, which requires the selection of various assumptions, including an expected long-term rate of return, discount rate, mortality rates of participants, expected rates of mortality improvement, and health care cost trend rates.

The approach to establishing the discount rate assumption for both our domestic and international plans is based on high-quality corporate bonds. The weighted-average discount rates used to calculate net periodic benefit cost for 2018 and year-end obligations as of December 31, 2018 were as follows:

	Pension Benefits		Other Postretirement Benefits
	U.S. Plans	Non-U.S. Plans	
Used to calculate net periodic benefit cost	4.1%	2.4 %	4.2 %
Used to calculate benefit obligations	4.2%	2.6 %	4.3 %

Our approach to determining expected return on plan asset assumptions evaluates both historical returns as well as estimates of future returns, and is adjusted for any expected changes in the long-term outlook for the equity and fixed income markets and for changes in the composition of pension plan assets. As a result, our estimate of the weighted average long-term rate of return on plan assets for all of our pension plans was lowered to 5.2% in 2018 from 5.5% in 2017.

Our pension plans generally do not require employee contributions. Our policy is to fund these pension plans in accordance with applicable domestic and international government regulations. At December 31, 2018, all legal funding requirements had been met.

The following table illustrates the sensitivity to a change in certain assumptions for our pension and postretirement benefit plan obligations. The changes in these assumptions have no effect on our funding requirements.

	Pension Benefits				Other Postretirement Benefits	
	U.S. Plans		Non-U.S. Plans			
	Change in 2019 pension expense	Change in PBO	Change in 2019 pension expense	Change in PBO	Change in 2019 pension expense	Change in PBO
	(Millions)					
25 basis point ("bp") decrease in discount rate	$—	$ 31	$(1)	$ 35	$ —	$ 8
25 bp increase in discount rate	$1	$ (30)	$1	$ (33)	$ —	$ (8)
25 bp decrease in return on assets rate	$2	n/a	$1	n/a	n/a	n/a
25 bp increase in return on assets rate	$(2)	n/a	$(1)	n/a	n/a	n/a

The assumed health care trend rate affects the amounts reported for our postretirement benefit plan obligations. The following table illustrates the sensitivity to a change in the assumed health care trend rate:

	Total service and interest cost	APBO
	(Millions)	
100 bp increase in health care cost trend rate	$ 1	$ 23
100 bp decrease in health care cost trend rate	$ (1)	$ (20)

Refer to Note 13, Pension Plans, Postretirement and Other Employee Benefits in Item 8, "Financial Statements and Supplementary Data" for more information regarding our pension and other postretirement employee benefit costs and assumptions.

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Warranty Reserves
Where we have offered product warranty and also provide for warranty costs. Provisions for estimated expenses related to product warranty are made at the time products are sold or when specific warranty issues are identified on OE products. These estimates are established using historical information about the nature, frequency, and average cost of warranty claims and upon specific warranty issues as they arise. The warranty terms vary but range from one year up to limited lifetime warranties on some of our premium aftermarket products. While we have not experienced any material differences between these estimates and our actual costs, it is reasonably possible that future warranty issues could arise that could have a significant effect on our consolidated financial statements.

Income Taxes
We recognize deferred tax assets and liabilities on the basis of the future tax consequences attributable to temporary differences that exist between the financial statement carrying value of assets and liabilities and their respective tax values, and net operating losses (“NOL”) and tax credit carryforwards on a taxing jurisdiction basis. We measure deferred tax assets and liabilities using enacted tax rates that will apply in the years in which we expect the temporary differences to be recovered or paid.

On December 22, 2017, the Tax Cuts and Jobs Act ("TCJA") was enacted into U.S. law, which, among other provisions, lowered the corporate income tax rate effective January 1, 2018 from the currently applicable 35% rate to a new 21% rate, and implemented significant changes with respect to U.S. tax treatment of earnings originating from outside the U.S. Many of the provisions of TCJA are subject to regulatory interpretation and U.S. state conforming enactment. The TCJA also includes an anti-deferral provision (the Global Intangible Low-Taxed Income tax) effective starting in 2018 wherein taxes on foreign income are imposed in excess of a deemed return on tangible assets of non-U.S. corporations.

We evaluate our deferred income tax assets quarterly to determine if valuation allowances are required or should be adjusted. U.S. GAAP requires that companies assess whether valuation allowances should be established against their deferred tax assets based on consideration of all available evidence, both positive and negative, using a “more likely than not” standard. This assessment considers, among other matters, the nature, frequency and amount of recent losses, the duration of statutory carryforward periods, and tax planning strategies. In making such judgments, significant weight is given to evidence that can be objectively verified.

Valuation allowances are established for deferred tax assets based on a “more likely than not” threshold. The ability to realize deferred tax assets depends on our ability to generate sufficient taxable income within the carryforward periods provided for in the tax law for each tax jurisdiction. We consider the following possible sources of taxable income when assessing the realization of our deferred tax assets and the need for a valuation allowance:

- Future reversals of existing taxable temporary differences;
- Taxable income or loss, based on recent results, exclusive of reversing temporary differences and carryforwards;
- Tax-planning strategies; and
- Taxable income in prior carryback years if carryback is permitted under the relevant tax law.

The valuation allowances recorded against deferred tax assets in certain foreign jurisdictions will impact our provision for income taxes until the valuation allowances are released. Our provision for income taxes will include no tax benefit for losses incurred and no tax expense with respect to income generated in these jurisdictions until the respective valuation allowance is eliminated.

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MARKET RISK SENSITIVITY

We are exposed to certain global market risks, including foreign currency exchange risk, commodity price risk, interest rate risk associated with our debt, and equity price risk associated with our share-based compensation awards.

Foreign Currency Exchange Rate Risk

We manufacture and sell our products in North America, South America, Asia, Europe, and Africa. As a result, our financial results could be significantly affected by factors such as changes in foreign currency exchange rates or weak economic conditions in foreign markets in which we manufacture and sell our products. We generally try to use natural hedges within our foreign currency activities, including the matching of revenues and costs, to minimize foreign currency risk. Where natural hedges are not in place, we consider managing certain aspects of our foreign currency activities and larger transactions through the use of foreign currency options or forward contracts. Principal currencies hedged have historically included the U.S. dollar, euro, British pound, Polish zloty, and Mexican peso.

Foreign Currency Forward Contracts — We enter into foreign currency forward purchase and sale contracts to mitigate our exposure to changes in exchange rates on certain intercompany and third-party trade receivables and payables. In managing our foreign currency exposures, we identify and aggregates existing offsetting positions and then hedge residual exposures through third-party derivative contracts. The gain or loss on these contracts is recorded as foreign currency gains (losses) within cost of sales in the consolidated statements of income. The fair value of foreign currency forward contracts are recorded in "Prepayments and other current assets" or "Accrued expenses and other current liabilities" in the consolidated balance sheets. The fair value of the Company's foreign currency forward contracts was a net asset position of less than $1 million at December 31, 2018 and a net liability position of less than $1 million at December 31, 2017.

The following table summarizes by major currency the notional amounts for foreign currency forward purchase and sale contracts as of December 31, 2018 (all of which mature in 2019):

		Notional Amount in Foreign Currency (Millions)	
Canadian dollars	—Sell	(2	)
European euro	—Purchase	1	
	—Sell	(8	)
Polish zloty	—Purchase	35	
Mexican pesos	—Purchase	211	
U.S. dollars	—Purchase	2	
	—Sell	(11	)

A hypothetical 10% adverse change in the U.S. relative to all other currencies would not materially affect our consolidated financial position, results of operations or cash flows with regard to changes in the fair values of foreign currency forward contracts.

We are exposed to foreign currency risk due to translation of the results of certain international operations into U.S. dollars as part of the consolidation process. Fluctuations in foreign currency exchange rates can therefore create volatility in the results of operations and may adversely affect our financial condition.

The following table summarizes the amounts of foreign currency translation and transaction losses:

	Years Ended December 31

	2018	2017
	(Millions)	
Translation gains (losses) recorded in accumulated other comprehensive income (loss)	$(134)	$106
Transaction gains (losses) recorded in earnings	$(4)	$1

Senior Secured Notes — We have foreign currency denominated debt, €752 million of which was designated as a net investment hedge in certain foreign subsidiaries and affiliates of ours. As such, an adverse change in foreign currency exchange rates will have no effect on earnings. For the portion not designated as a net investment hedge, we have other natural hedges in place that will offset any adverse change in foreign currency exchange rates.

A hypothetical 10% adverse change in foreign exchange rates between the euro and U.S. dollar would increase the amount of cash required to settle the these notes by approximately $122 million as of December 31, 2018.

Commodity Price Risk

Commodity rate price forward contracts are executed to offset a portion of our exposure to the potential change in prices for raw materials including copper, nickel, tin, zinc, and aluminum. The fair value of our commodity price forward contracts was a liability of $2 million on an equivalent notional amount of $27 million as of December 31, 2018. A hypothetical 10% adverse change in commodity prices would not materially affect our consolidated financial position, results of operations or cash flows with regard to changes in the fair values of commodity forward contracts.

Interest Rate Risk

Our financial instruments that are sensitive to market risk for changes in interest rates are primarily our debt securities. We use our revolving credit facilities to finance our short-term and long-term capital requirements. We pay a current market rate of interest on these borrowings. Our long-term capital requirements have been financed with long-term debt with original maturity dates ranging from four to ten years. On December 31, 2018, we had $1.6 billion par value of fixed rate debt and $3.7 billion par value of floating rate debt. Of the fixed rate debt, $476 million is fixed through 2022, $626 million is fixed through 2024, and $500 million is fixed through 2026. For more detailed explanations on our debt structure and senior credit facility refer to “Liquidity and Capital Resources — Capitalization” earlier in this Management’s Discussion and Analysis.

We estimate the fair value of our long-term debt at December 31, 2018 was about 102% of its book value. A hypothetical one percentage point increase or decrease in interest rates would increase or decrease the annual interest expense we recognize in the income statement and the cash we pay for interest expense by about $7 million.

Equity Price Risk

We also utilize an equity swap arrangement to offset changes in liabilities related to the equity market risks of our arrangements for deferred compensation and restricted stock unit awards. Gain or losses from changes in the fair value of these equity swaps are generally offset by the losses or gains on the related liabilities. We selectively use cash-settled equity swaps to reduce market risk associated with our deferred compensation liabilities. These equity compensation liabilities increase as our stock price increases and decrease as our stock price decreases. In contrast, the value of the swap agreement moves in the opposite direction of these liabilities, allowing us to fix a portion of the liabilities at a certain amount. The fair value of the equity swap agreement was an asset of $4 million related to approximately 250,000 common share equivalents as of December 31, 2018. A hypothetical 10% adverse change in share prices would not materially affect our consolidated financial position, results of operations or cash flows with regard to the equity swaps as an offsetting change would be applied to the related deferred compensation liability.

ENVIRONMENTAL MATTERS, LEGAL PROCEEDINGS AND PRODUCT WARRANTIES

Note 15—Commitments and Contingencies of the consolidated financial statements located in Part II Item 8 — Financial Statements and Supplemental Data is incorporated herein by reference.

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

Information required by Item 7A appears in Note 2 - “Summary of Significant Accounting Policies,” Note 9 - “Derivatives and Hedging Activities” and Note 10 - “Fair value of Financial Instruments” of Part II, Item 8 "Financial Statements and Supplementary Data." Other information required by Item 7A is included in Part II, Item 7 “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

ITEM 8.FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA.
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AND CONSOLIDATED SUBSIDIARIES

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MANAGEMENT’S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Management of Tenneco Inc. is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Rule 13a-15(f) and Rule 15d-15(f) under the Securities Exchange Act of 1934, as amended (the "Exchange Act")). Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management assessed the effectiveness of the Company’s internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”) in Internal Control-Integrated Framework (2013).

Based on our assessment management concluded the Company’s internal control over financial reporting was effective as of December 31, 2018.

Management has excluded Federal-Mogul from its assessment of internal control over financial reporting as of December 31, 2018 because it was acquired by the Company in a purchase business combination during 2018. Total assets and total revenues of the acquired Federal-Mogul business represent approximately 41% and 16%, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2018.

The effectiveness of our internal control over financial reporting as of December 31, 2018 has been audited by PricewaterhouseCoopers LLP, our independent registered public accounting firm, as stated in their report, which is included herein.

March 15, 2019

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Shareholders of Tenneco Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Tenneco Inc. and its subsidiaries (the “Company”) as of December 31, 2018 and 2017, and the related consolidated statements of income, comprehensive income (loss), changes in shareholders’ equity and cash flows for each of the three years in the period ended December 31, 2018, including the related notes and financial statement schedule listed in the index appearing under Item 15 (collectively referred to as the “consolidated financial statements”). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.

Change in Accounting Principles

As discussed in Note 2 to the consolidated financial statements, the Company changed the manner in which it accounts for certain components of net periodic pension and postretirement benefit costs and the manner in which it accounts for the cash received to settle the deferred purchase price of factored receivables in 2018.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Report on Internal Control Over Financial Reporting. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

As described in Management’s Report on Internal Control Over Financial Reporting, management has excluded Federal-Mogul from its assessment of internal control over financial reporting as of December 31, 2018 because it was acquired by the Company in a purchase business combination during 2018. We have also excluded Federal-Mogul from our audit of internal control over financial reporting. Federal-Mogul's total assets and total revenues excluded from management’s assessment and our audit of internal control over financial reporting represent approximately 41% and 16%, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2018.

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Definition and Limitations of Internal Control over Financial Reporting

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

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

/S/ PRICEWATERHOUSECOOPERS LLP
Milwaukee, Wisconsin
March 15, 2019

We have served as the Company’s auditor since 2010.

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TENNECO INC.
CONSOLIDATED STATEMENTS OF INCOME

	Year Ended December 31		
	2018	2017	2016
	(Millions Except Share and Per Share Amounts)		
Revenues			
Net sales and operating revenues	$11,763	$ 9,274	$ 8,597
Costs and expenses			
Cost of sales (exclusive of depreciation and amortization)	10,071	7,812	7,126
Selling, general, and administrative	794	638	514
Depreciation and amortization	345	226	213
Engineering, research, and development	204	158	153
Goodwill impairment charge	3	11	—
	11,417	8,845	8,006
Other expense (income)			
Loss on sale of receivables	16	5	5
Non-service pension and postretirement benefit costs	20	16	84
Loss on extinguishment of debt	10	1	24
Equity in (earnings) losses of nonconsolidated affiliates, net of tax	(18)	1	—
Other expense (income), net	12	(2)	(1)
	40	21	112
Earnings before interest expense, income taxes, and noncontrolling interests	306	408	479
Interest expense	132	72	68
Earnings before income taxes and noncontrolling interests	174	336	411
Income tax expense (benefit)	63	71	(4)
Net income	111	265	415
Less: Net income attributable to noncontrolling interests	56	67	68
Net income attributable to Tenneco Inc.	$55	$ 198	$ 347
Earnings per share			
Weighted average shares of common stock outstanding —			
Basic	58,625,087	52,796,184	55,939,135
Diluted	58,758,732	53,026,911	56,407,436
Basic earnings per share of common stock	$0.93	$ 3.75	$ 6.20
Diluted earnings per share of common stock	$0.93	$ 3.73	$ 6.15

The accompanying notes to the consolidated financial statements are an integral part of these consolidated statements of income.

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TENNECO INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Net income	$111	$265	$415
Other comprehensive income (loss)—net of tax			
Foreign currency translation adjustment	(134)	106	(56)
Defined benefit plans	(22)	17	51
	(156)	123	(5)
Comprehensive income (loss)	(45)	388	410
Less: Comprehensive income (loss) attributable to noncontrolling interests	54	69	64
Comprehensive income (loss) attributable to common shareholders	$(99)	$319	$346

The accompanying notes to the consolidated financial statements are an integral part of these consolidated statements of comprehensive income (loss).

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TENNECO INC.
CONSOLIDATED BALANCE SHEETS

	December 31	
	2018	2017
	(Millions)	
ASSETS		
Current assets:		
Cash and cash equivalents	$697	$315
Restricted cash	5	3
Receivables:		
Customer notes and accounts, net	2,487	1,294
Other	85	27
Inventories	2,245	820
Prepayments and other current assets	590	288
Total current assets	6,109	2,747
Property, plant and equipment, net	3,501	1,691
Long-term receivables, net	10	9
Goodwill	869	49
Intangibles, net	1,519	22
Investments in nonconsolidated affiliates	544	2
Deferred income taxes	467	213
Other assets	213	63
Total assets	$13,232	$4,796
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Short-term debt, including current maturities of long-term debt	$153	$103
Accounts payable	2,759	1,582
Accrued compensation and employee benefits	343	141
Accrued income taxes	64	27
Accrued expenses and other current liabilities	1,001	424
Total current liabilities	4,320	2,277
Long-term debt	5,340	1,358
Deferred income taxes	88	11
Pension and postretirement benefits	1,167	268
Deferred credits and other liabilities	263	158
Commitments and contingencies		
Total liabilities	11,178	4,072
Redeemable noncontrolling interests	138	42
Tenneco Inc. shareholders' equity:		
Preferred stock—$0.01 par value; none issued	—	—
Class A voting common stock—$0.01 par value; shares issued: (2018—71,675,379; 2017—66,033,509)	1	1
Class B non-voting convertible common stock—$0.01 par value; 2018—23,793,669 shares issued	—	—
Additional paid-in capital	4,360	3,112
Accumulated other comprehensive loss	(692)	(538)
Accumulated deficit	(1,013)	(1,009)
	2,656	1,566
Shares held as treasury stock—at cost: 2018 and 2017—14,592,888 shares	(930)	(930)

Total Tenneco Inc. shareholders’ equity	1,726	636
Noncontrolling interests	190	46
Total equity	1,916	682
Total liabilities, redeemable noncontrolling interests and equity	$13,232	$4,796

The accompanying notes to the consolidated financial statements are an integral part of these consolidated balance sheets.

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TENNECO INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Operating Activities			
Net income	$ 111	$ 265	$ 415
Adjustments to reconcile net income to cash provided by operating activities:			
Goodwill impairment charge	3	11	—
Depreciation and amortization	345	226	213
Deferred income taxes	(65)	(8)	(84)
Stock-based compensation	14	14	14
Restructuring charges and asset impairments, net of cash paid	49	8	(13)
Change in pension and postretirement benefit plans	(8)	(15)	47
Equity in earnings of nonconsolidated affiliates	(18)	1	—
Cash dividends received from nonconsolidated affiliates	2	—	—
Loss on sale of assets	16	5	4
Changes in operating assets and liabilities:			
Receivables	(190)	(81)	(325)
Inventories	27	(94)	(55)
Payables and accrued expenses	291	136	140
Accrued interest and income taxes	(19)	1	13
Other assets and liabilities	(119)	48	5
Net cash provided by operating activities	439	517	374
Investing Activities			
Federal-Mogul acquisition, net of cash acquired	(2,194)	—	—
Proceeds from sale of assets	9	8	6
Proceeds from sale of equity interest	—	9	—
Cash payments for plant, property, and equipment	(507)	(419)	(345)
Proceeds from deferred purchase price of factored receivables	174	112	110
Other	4	(10)	—
Net cash used by investing activities	(2,514)	(300)	(229)
Financing Activities			
Proceeds from term loans and notes	3,426	160	529
Repayments of term loans and notes	(453)	(36)	(545)
Borrowings on revolving lines of credit	5,149	6,664	5,417
Payments on revolving lines of credit	(5,405)	(6,737)	(5,221)
Issuance (repurchase) of common shares	(1)	(1)	13
Cash dividends	(59)	(53)	—
Debt issuance cost of long-term debt	(95)	(8)	(9)
Purchase of common stock under the share repurchase program	—	(169)	(225)
Net increase (decrease) in bank overdrafts	(5)	(7)	10
Other	(30)	—	—
Distributions to noncontrolling interest partners	(51)	(64)	(55)
Net cash provided (used) by financing activities	2,476	(251)	(86)
Effect of foreign exchange rate changes on cash, cash equivalents and restricted cash	(17)	3	2
Increase (decrease) in cash, cash equivalents and restricted cash	384	(31)	61

Cash, cash equivalents and restricted cash, January 1	318	349	288
Cash, cash equivalents and restricted cash, December 31	$ 702	$ 318	$ 349
Supplemental Cash Flow Information			
Cash paid during the year for interest	$ 143	$ 78	$ 76
Cash paid during the year for income taxes, net of refunds	$ 113	$ 95	$ 113
Non-cash Investing and Financing Activities			
Period end balance of trade payables for plant, property, and equipment	$ 135	$ 59	$ 68
Deferred purchase price of receivables factored in period	$ 154	$ 114	$ 109
Stock issued for acquisition of Federal-Mogul	$ (1,236)	$ —	$ —
Stock transferred for acquisition of Federal-Mogul	$ 1,236	$ —	$ —

The accompanying notes to the consolidated financial statements are an integral part of these consolidated statements of cash flows.

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TENNECO INC.
CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

	Tenneco Inc. Shareholders' equity							
	$0.01 Par Value Common Stock	Additional Paid-In Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Treasury Stock	Total Tenneco Inc. Shareholders' Equity	Noncontrolling Interests	Total Equity
	(Millions)							
Balance as of December 31, 2015	$1	$ 3,081	$ (658)	$ (1,501)	$ (536)	$ 387	$39	$426
Net income	—	—	—	347	—	347	32	379
Other comprehensive loss—net of tax:								
Foreign currency translation adjustment	—	—	(52)	—	—	(52)	(2)	(54)
Defined benefit plans	—	—	51	—	—	51	—	51
Comprehensive income						346	30	376
Stock-based compensation expense	—	17	—	—	—	17	—	17
Purchases of treasury stock	—	—	—	—	(225)	(225)	—	(225)
Distributions declared to noncontrolling interests	—	—	—	—	—	—	(22)	(22)
Balance as of December 31, 2016	1	3,098	(659)	(1,154)	(761)	525	47	572
Net income	—	—	—	198	—	198	31	229
Other comprehensive loss—net of tax:								
Foreign currency translation adjustments	—	—	104	—	—	104	(1)	103
Defined benefit plans	—	—	17	—	—	17	—	17
Comprehensive income						319	30	349
Stock-based compensation expense	—	14	—	—	—	14	—	14
Cash dividends ($1.00 per share)	—	—	—	(53)	—	(53)	—	(53)
Purchases of treasury stock	—	—	—	—	(169)	(169)	—	(169)
Distributions declared to noncontrolling interests	—	—	—	—	—	—	(31)	(31)
Balance as of December 31, 2017	1	3,112	(538)	(1,009)	(930)	636	46	682
Net income	—	—	—	55	—	55	27	82
Other comprehensive loss—net of tax:								
Foreign currency translation adjustments	—	—	(132)	—	—	(132)	—	(132)
Defined benefit plans	—	—	(22)	—	—	(22)	—	(22)
Comprehensive income						(99)	27	(72)
Adjustments to adopt new accounting standards [1]	—	—	—	—	—	—	—	—
Common stock issued	—	1,236	—	—	—	1,236	—	1,236
Federal-Mogul Acquisition	—	—	—	—	—	—	143	143
Stock-based compensation expense	—	12	—	—	—	12	—	12
Cash dividends ($1.00 per share)	—	—	—	(59)	—	(59)	—	(59)
Distributions declared to noncontrolling interests	—	—	—		—	—	(26)	(26)

Balance as of December 31, 2018	$1	$ 4,360	$ (692)	$ (1,013)	$ (930)	$ 1,726	$190	$1,916

(1) The cumulative effect of the adoption of ASU 2016-16 was an increase to accumulated deficit of $1 million, and the cumulative effect of the adoption of ASC 606 was a decrease to accumulated deficit of $1 million.

The accompanying notes to the consolidated financial statements are an integral
part of these statements of changes in shareholders’ equity.

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TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Description of Business

Tenneco Inc. ("Tenneco" or "the Company") was formed under the laws of Delaware in 1996. Tenneco designs, manufactures, and sells products and services for light vehicle, commercial truck, off-highway, industrial and aftermarket customers. The Company is one of the world's leading manufacturers of clean air, powertrain, and ride performance products and systems, and serves both original equipment manufacturers ("OEM") and replacement markets worldwide.

Effective October 1, 2018, the Company completed the acquisition (the "Acquisition") of Federal-Mogul LLC ("Federal-Mogul"), a global supplier of technology and innovation in vehicle and industrial products for fuel economy, emissions reductions, and safety systems. Federal-Mogul serves the world's foremost OEM and servicers ("OES", and together with OEM, "OE") of automotive, light, medium and heavy-duty commercial vehicles, off road, agricultural, marine, rail, aerospace, power generation, and industrial equipment, as well as the worldwide aftermarket. The Company expects to separate its businesses to form two new, independent publicly traded companies, an Aftermarket and Ride Performance company and a new Powertrain Technology company, in the second half of 2019.

2. Summary of Significant Accounting Policies

Basis of Presentation

The consolidated financial statements of the Company have been prepared in accordance with accounting principles generally accepted in the United States ("U.S. GAAP").

Revision of Previously Issued Financial Statements

The Company identified an error in the accounting for certain costs capitalized into inventory that did not constitute inventoriable costs in its historical financial statements. Costs incorrectly capitalized in ending inventory were $49 million and $42 million as of December 31, 2017 and 2016.

The Company evaluated the effect of this item as well as the items discussed below on prior periods under the guidance of SEC Staff Accounting Bulletin (SAB) No. 99, "Materiality" and determined the amounts were not material, individually or in the aggregate, to previously issued financial statements. The Company also evaluated the effect of correcting these items through a cumulative adjustment to our financial statements and concluded, based on the guidance within SEC SAB No. 108, "Considering the Effects of Prior Year Misstatements when Quantifying Misstatements in Current Year Financial Statements", it was appropriate to revise our previously issued financial statements to correct these errors. The Company also revised for other immaterial errors including (i) capitalization errors related to construction-in-process; (ii) errors related to the estimation of warranty and rebate liabilities; (iii) errors related to the cash flow presentation for borrowings and repayments on revolving lines of credit (net versus gross); (iv) errors related to currency on certain non-income tax transactions; and (v) errors surrounding the misclassification of translation adjustments within accumulated other comprehensive income. These adjustments related to various line items as shown in the tables below. As a result, certain amounts in the consolidated financial statements have been revised, and will be revised for interim periods in future filings, in order to correct for these errors. These revisions have also been reflected in Note 22, Quarterly Financial Data (Unaudited) to show the effects in the unaudited quarterly financial statements.

Reclassifications: Certain amounts in the prior years have been aggregated or disaggregated to conform to current year presentation. These reclassifications have no effect on previously reported earnings before income taxes and noncontrolling interests or net income, other comprehensive income (loss), current or total assets, current or total liabilities, and the cash provided (used) by operating, investing or financing activities within the consolidated statements of cash flows.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

The following tables present the effect of these reclassifications and revisions for the financial statement line items adjusted in the affected periods included within this annual financial report:

	Year Ended December 31, 2017				
	As Reported	Reclasses	As Reclassified	Revisions	As Revised
	(Millions, except per share amounts)				
Consolidated statement of income					
Revenues					
Net sales and operating revenues	$9,274	$ —	$ 9,274	$ —	$9,274
Costs and expenses					
Cost of sales (exclusive of depreciation and amortization)	7,809	—	7,809	3	7,812
Selling, general, and administrative	636	—	636	2	638
Depreciation and amortization	224	—	224	2	226
Engineering, research, and development	158	—	158	—	158
Goodwill impairment charge	11	—	11	—	11
	8,838	—	8,838	7	8,845
Other expense (income)					
Loss on sale of receivables	5	—	5	—	5
Non-service pension and postretirement benefit costs	—	16	16	—	16
Loss on extinguishment of debt	—	1	1	—	1
Equity in (earnings) losses of nonconsolidated affiliates, net of tax	—	1	1	—	1
Other expense (income), net	14	(17)	(3)	1	(2)
	19	1	20	1	21
Earnings before interest expense, income taxes, and noncontrolling interests	417	(1)	416	(8)	408
Interest expense	73	(1)	72	—	72
Earnings before income taxes and noncontrolling interests	344	—	344	(8)	336
Income tax expense (benefit)	70	—	70	1	71
Net income	274	—	274	(9)	265
Less: Net income attributable to noncontrolling interests	67		67	—	67
Net income attributable to Tenneco Inc.	$207	$ —	$ 207	$ (9)	$198
Earnings per share					
Weighted average shares of common stock outstanding —					
Basic earnings per share of common stock	$3.93	$ —	$ 3.93	$ (0.18)	$3.75
Diluted earnings per share of common stock	$3.91	$ —	$ 3.91	$ (0.18)	$3.73

	Year Ended December 31, 2017				
	As Reported	Reclasses	As Reclassified	Revisions	As Revised
Consolidated statement of comprehensive income	(Millions)				
Net income	$274	$ —	$ 274	$ (9)	$ 265
Other comprehensive income (loss)—net of tax					
Foreign currency translation adjustment	99	—	99	7	106
Defined benefit plans	27	—	27	(10)	17
	126	—	126	(3)	123
Comprehensive income (loss)	400	—	400	(12)	388
	69	—	69	—	69

Less: Comprehensive income (loss) attributable to noncontrolling interests					
Comprehensive income (loss) attributable to common shareholders	$331	$ —	$ 331	$ (12)	$ 319

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TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

	Year Ended December 31, 2016				
	As Reported	Reclasses	As Reclassified	Revisions	As Revised
	(Millions, except per share amounts)				
Consolidated statement of income					
Revenues					
Net sales and operating revenues	$8,599	$ —	$ 8,599	$ (2)	$8,597
Costs and expenses					
Cost of sales (exclusive of depreciation and amortization)	7,116	—	7,116	10	7,126
Selling, general, and administrative	513	—	513	1	514
Depreciation and amortization	212	—	212	1	213
Engineering, research, and development	154	—	154	(1)	153
	7,995	—	7,995	11	8,006
Other expense (income)					
Loss on sale of receivables	5	—	5	—	5
Non-service pension and postretirement benefit costs	—	84	84	—	84
Loss on extinguishment of debt	—	24	24	—	24
Other expense (income), net	83	(84)	(1)	—	(1)
	88	24	112	—	112
Earnings before interest expense, income taxes, and noncontrolling interests	516	(24)	492	(13)	479
Interest expense	92	(24)	68	—	68
Earnings before income taxes and noncontrolling interests	424	—	424	(13)	411
Income tax expense (benefit)	—	—	—	(4)	(4)
Net income	424	—	424	(9)	415
Less: Net income attributable to noncontrolling interests	68	—	68	—	68
Net income attributable to Tenneco Inc.	$356	$ —	$ 356	$ (9)	$347
Earnings per share					
Weighted average shares of common stock outstanding —					
Basic earnings per share of common stock	$6.36	$ —	$ 6.36	$ (0.16)	$6.20
Diluted earnings per share of common stock	$6.31	$ —	$ 6.31	$ (0.16)	$6.15

	Year Ended December 31, 2016				
	As Reported	Reclasses	As Reclassified	Revisions	As Revised
Consolidated statement of comprehensive income	(Millions)				
Net income	$424	$ —	$ 424	$ (9)	$ 415
Other comprehensive income (loss)—net of tax					
Foreign currency translation adjustment	(45)	—	(45)	(11)	(56)
Defined benefit plans	41	—	41	10	51
	(4)	—	(4)	(1)	(5)
Comprehensive income (loss)	420	—	420	(10)	410
Less: Comprehensive income (loss) attributable to noncontrolling interests	64	—	64	—	64
Comprehensive income (loss) attributable to common shareholders	$356	$ —	$ 356	$ (10)	$ 346

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TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

	December 31, 2017				
	As Reported	Reclasses	As Reclassified	Revisions	As Revised
Consolidated balance sheet	(Millions)				
Current assets:					
Cash and cash equivalents	$315	$ —	$ 315	$ —	$315
Restricted cash	3	—	3	—	3
Receivables:					
Customer notes and accounts, net	1,294	—	1,294	—	1,294
Other	27	—	27	—	27
Inventories	869	—	869	(49)	820
Prepayments and other current assets	291	—	291	(3)	288
Total current assets	2,799	—	2,799	(52)	2,747
Property, plant and equipment, net	1,615	79	1,694	(3)	1,691
Long-term receivables, net	9	—	9	—	9
Goodwill	49	—	49	—	49
Intangibles, net	22	—	22	—	22
Investments in nonconsolidated affiliates	—	2	2	—	2
Deferred income taxes	204	—	204	9	213
Other assets	144	(81)	63	—	63
Total assets	$4,842	$ —	$ 4,842	$ (46)	$4,796
Short-term debt, including current maturities of long-term debt	$83	$ 20	$ 103	$ —	$103
Accounts payable	1,705	(123)	1,582	—	1,582
Accrued compensation and employee benefits		141	141	—	141
Accrued income taxes	45	(20)	25	2	27
Accrued interest	14	(14)	—	—	—
Accrued liabilities	287	(287)	—	—	—
Other	132	(132)	—	—	
Accrued expenses and other current liabilities		415	415	9	424
Total current liabilities	2,266	—	2,266	11	2,277
Long-term debt	1,358	—	1,358	—	1,358
Deferred income taxes	11	—	11	—	11
Pension and postretirement benefits	268	—	268	—	268
Deferred credits and other liabilities	155	—	155	3	158
Commitments and contingencies					
Total liabilities	4,058	—	4,058	14	4,072
Redeemable noncontrolling interests	42		42	—	42
Tenneco Inc. shareholders' equity:					
Preferred stock—$0.01 par value; none issued	—	—	—	—	—
Class A voting common stock—$0.01 par value; shares issued: (2018—71,675,379; 2017—66,033,509)	1	—	1	—	1
Additional paid-in capital	3,112	—	3,112	—	3,112
Accumulated other comprehensive loss	(541)	—	(541)	3	(538)
Accumulated deficit	(946)	—	(946)	(63)	(1,009)
	1,626	—	1,626	(60)	1,566
	(930)	—	(930)	—	(930)

Shares held as treasury stock—at cost: 2018 and 2017—14,592,888 shares					
Total Tenneco Inc. shareholders' equity	696	—	696	(60)	636
Noncontrolling interests	46	—	46	—	46
Total equity	742	—	742	(60)	682
Total liabilities, redeemable noncontrolling interests and equity	$4,842	$ —	$ 4,842	$ (46)	$4,796

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

	Year Ended December 31, 2017				
	As Reported	Reclasses	As Reclassified	Revisions	As Revised
Consolidated statements of cash flow	(Millions)				
Operating Activities					
Net income	$274	$ —	$ 274	$ (9)	$ 265
Net cash provided by operating activities	517	—	517	—	517
Investing Activities					
Net cash used by investing activities	(300)	—	(300)	—	(300)
Financing Activities					
Proceeds from term loans and notes	—	137	137	23	160
Repayments of term loans and notes	—	(19)	(19)	(17)	(36)
Retirement of long-term debt	(19)	19	—	—	—
Issuance of long-term debt	137	(137)	—	—	—
Borrowings on revolving lines of credit	—	—	—	6,664	6,664
Payments on revolving lines of credit	—	—	—	(6,737)	(6,737)
Net increase (decrease) in revolver borrowings	(67)	—	(67)	67	—
Net cash provided (used) by financing activities	$(251)	$ —	$ (251)	$ —	$ (251)

	Year Ended December 31, 2016				
	As Reported	Reclasses	As Reclassified	Revisions	As Revised
Consolidated statements of cash flow	(Millions)				
Operating Activities					
Net income	$424	$ —	$ 424	$ (9)	$ 415
Net cash provided by operating activities	374	—	374	—	374
Investing Activities					
Net cash used by investing activities	(229)	—	(229)	—	(229)
Financing Activities					
Proceeds from term loans and notes	—	509	509	20	529
Repayments of term loans and notes	—	(531)	(531)	(14)	(545)
Retirement of long-term debt	(531)	531	—	—	—
Issuance of long-term debt	509	(509)	—	—	—
Borrowings on revolving lines of credit	—	—	—	5,417	5,417
Payments on revolving lines of credit	—	—	—	(5,221)	(5,221)
Net increase (decrease) in revolver borrowings	202	—	202	(202)	—
Net cash provided (used) by financing activities	$(86)	$ —	$ (86)	$ —	$ (86)

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

	Year Ended December 31, 2017		
	As Reported	Revisions	As Revised
Consolidated statements of shareholders' equity	(Millions)		
Accumulated Deficit			
Balance January 1	$(1,100)	$ (54)	$(1,154)
Net income attributable to Tenneco Inc.	207	(9)	198
Cash dividends declared	(53)	—	(53)
Balance December 31	$(946)	$ (63)	$(1,009)
Accumulated Other Comprehensive Loss			
Balance January 1	$(665)	$ 6	$(659)
Other comprehensive loss—net of tax:			
Foreign currency translation adjustment	97	7	104
Defined benefit plans	27	(10)	17
Balance December 31	$(541)	$ 3	$(538)
Total Tenneco Inc. Shareholders' Equity			
Balance January 1	$573	$ (48)	$525
Net income attributable to Tenneco Inc.	207	(9)	198
Other comprehensive loss—net of tax:			
Foreign currency translation adjustment	97	7	104
Defined benefit plans	27	(10)	17
Comprehensive income	331	(12)	319
Stock-based compensation expense	14	—	14
Cash dividends	(53)	—	(53)
Treasury stock	(169)	—	(169)
Balance December 31	$696	$ (60)	$636
Total Equity			
Balance January 1	$620	$ (48)	$572
Net income	238	(9)	229
Other comprehensive loss—net of tax:			
Foreign currency translation adjustment	96	7	103
Defined benefit plans	27	(10)	17
Comprehensive income	361	(12)	349
Stock-based compensation expense	14	—	14
Cash dividends	(53)	—	(53)
Treasury stock	(169)	—	(169)
Distributions declared to noncontrolling interests	(31)	—	(31)
Balance December 31	$742	$ (60)	$682

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

	Year Ended December 31, 2016		
	As Reported	Revisions	As Revised
Consolidated statements of shareholders' equity	(Millions)		
Accumulated Deficit			
Balance January 1	$(1,456)	$ (45)	$(1,501)
Net income attributable to Tenneco Inc.	356	(9)	347
Balance December 31	$(1,100)	$ (54)	$(1,154)
Accumulated Other Comprehensive Loss			
Balance January 1	$(665)	$ 7	$(658)
Other comprehensive loss—net of tax:			
Foreign currency translation adjustment	(41)	(11)	(52)
Defined benefit plans	41	10	51
Balance December 31	$(665)	$ 6	$(659)
Total Tenneco Inc. shareholders' equity			
Balance January 1	$425	$ (38)	$387
Net income attributable to Tenneco Inc.	356	(9)	347
Other comprehensive loss—net of tax:			
Foreign currency translation adjustment	(41)	(11)	(52)
Defined benefit plans	41	10	51
Comprehensive income	356	(10)	346
Stock-based compensation expense	17	—	17
Treasury stock	(225)	—	(225)
Balance December 31	$573	$ (48)	$525
Total Equity			
Balance January 1	$464	$ (38)	$426
Net income	388	(9)	379
Other comprehensive loss—net of tax:			
Foreign currency translation adjustment	(43)	(11)	(54)
Defined benefit plans	41	10	51
Comprehensive income	386	(10)	376
Stock-based compensation expense	17	—	17
Treasury stock	(225)	—	(225)
Distribution declared to noncontrolling interests	(22)	—	(22)
Balance December 31	$620	$ (48)	$572

Summary of Significant Accounting Policies

Principles of Consolidation: The Company consolidates into its financial statements the accounts of the Company, all wholly owned subsidiaries, and any partially owned subsidiary it has the ability to control. Control generally equates to ownership percentage, whereby investments more that 50% owned are consolidated, investments in affiliates of 50% or less but greater than 20% are accounted for using the equity method, and investments in affiliates of 20% or less are accounted for using the cost method. See Note 8, Investment in Nonconsolidated Affiliates.

The Company does not consolidate any entity for which it has a variable interest based solely on the power to direct the activities and significant participation in the entity's expected results that would not otherwise be consolidated

based on control through voting interests. Further, its affiliates are businesses established and maintained in connection with its operating strategy and are not special purpose entities. All intercompany transactions and balances have been eliminated.

Use of Estimates: The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the amounts reported therein. Due to the inherent uncertainty involved in making estimates, actual results reported in future periods may be based upon amounts that differ from these estimates.

Cash and Cash Equivalents: The Company considers all highly liquid investments with maturities of 90 days or less from the date of purchase to be cash equivalents. The carrying value of cash and cash equivalents approximate fair value.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Restricted Cash: The Company is required to provide cash collateral in connection with certain contractual arrangements and statutory requirements. The Company has $5 million and $3 million of restricted cash at December 31, 2018 and 2017 in support of these arrangements and requirements.

Notes and Accounts Receivable: Notes and accounts receivable are stated at net realizable value, which approximates fair value. Receivables are reduced by an allowance for amounts that may become uncollectible in the future. The allowance is an estimate based on historical collection experience, current economic and market conditions, and a review of the current status of each customer's trade accounts or notes receivable. A receivable is past due if payments have not been received within the agreed-upon invoice terms. Account balances are charged-off against the allowance when management determines the receivable will not be recovered.

The allowance for doubtful accounts on short-term and long-term accounts receivable was $17 million and $16 million at December 31, 2018 and 2017. The allowance for doubtful accounts on short-term and long-term notes receivable was zero at both December 31, 2018 and 2017.

Inventories: Inventories are stated at the lower of cost or net realizable value using the first-in, first-out (“FIFO”) or average cost methods. Work in process includes purchased parts such as substrates coated with precious metals. Cost of inventory includes direct materials, labor, and applicable manufacturing overhead costs. The value of inventories are reduced for excess and obsolescence based on management's review of on-hand inventories compared to historical and estimated future sales and usage. Inventory held at consignment locations is included in finished goods inventory as the Company retains full title and rights to the products.

Redeemable Noncontrolling Interests: The Company has noncontrolling interests with redemption features. These redemption features could require the Company to make an offer to purchase the noncontrolling interests at fair value in the event of a change in control of Tenneco Inc. or certain of its subsidiaries. As a result of the Acquisition, the Company acquired $10 million in redeemable noncontrolling interests (exclusive of interests related to a subsidiary in India) and triggered the related redemption features which provide the holders the option to require the Company to redeem the noncontrolling interests. The noncontrolling interest partners have elected not to require the Company to redeem their shares. The redemption of these redeemable noncontrolling interests is not solely within the Company's control. Accordingly, these noncontrolling interests are presented in the temporary equity section of the Company's consolidated balance sheets. The Company does not believe it is probable the redemption features related to these noncontrolling interest securities will be triggered as a change in control event is generally not probable until it occurs. As a result the noncontrolling interests have not been remeasured to redemption value.

In addition, the Company acquired $86 million in redeemable noncontrolling interests related to a subsidiary in India. The Company initiated the process to make a tender offer of the shares it does not own due to the change in control in accordance with local regulations triggered by the Acquisition. It is probable these shares will become redeemable during 2019 under the tender offer at a price that is representative of fair value and as a result the noncontrolling interest is presented in the temporary equity section of the Company’s consolidated balance sheets. At the Acquisition date, this redeemable noncontrolling interest was recorded at its estimated fair value based on the preliminary purchase price allocation. The carrying amount for this redeemable noncontrolling interest at December 31, 2018 is currently greater than the redemption value as evidenced by the tender offer price resulting in no adjustment to reflect the noncontrolling interest at redemption value.

At December 31, 2018, the Company had previously held redeemable noncontrolling interests of $35 million, for which the redemption is not solely within the Company's control and these noncontrolling interests are presented in the temporary equity section of the Company's consolidated balance sheets. The Company does not believe it is

probable the redemption features related to these noncontrolling interest securities will be triggered as a change in control event is generally not probable until it occurs. As such, the noncontrolling interests have not been remeasured to redemption value.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

The following is a rollforward of the activity in the redeemable noncontrolling interests for the years ended December 31, 2018, 2017 and 2016:

	December 31		
	2018	2017	2016
	(Millions)		
Balance January 1	$42	$40	$41
Federal-Mogul acquisition	96	—	—
Net income attributable to redeemable noncontrolling interests	29	36	36
Other comprehensive (loss) income	(2)	3	(2)
Contributions received	6	—	—
Dividends declared	(33)	(37)	(35)
Balance December 31	$138	$42	$40

Long-Lived Assets: Long-lived assets, such as property, plant and equipment and definite-lived intangible assets are recorded at cost or fair value established at acquisition. Definite-lived intangible assets include customer relationships and platforms, patented and unpatented technology, and licensing agreements. Long-lived asset groups are evaluated for impairment when impairment indicators exist. If the carrying value of a long-lived asset group is impaired, an impairment charge is recorded for the amount by which the carrying value of the long-lived asset group exceeds its fair value. Depreciation and amortization are computed principally on a straight-line basis over the estimated useful lives of the assets for financial reporting purposes. Expenditures for maintenance and repairs are expensed as incurred.

Goodwill, net: Goodwill is determined as the excess of fair value over amounts attributable to specific tangible and intangible assets. Goodwill is evaluated for impairment annually, during the fourth quarter, or more frequently, if impairment indicators exist. An impairment indicator exists when a reporting unit's carrying value exceeds its fair value. When performing the goodwill impairment testing, a reporting units' fair value is based on valuation techniques using the best available information. The assessment of fair value utilizes a combination of the income approach and market approach. The impairment charge is the excess of the goodwill carrying value over the implied fair value of goodwill using a one-step quantitative approach.

Trade names and trademarks: Trade names and trademarks are stated at fair value established at acquisition or cost. These indefinite-lived intangible assets will be evaluated for impairment annually during the fourth quarter, or more frequently, if impairment indicators exist. An impairment exists when a trade name and trademarks' carrying value exceeds its fair value. The fair values of these assets are based upon the prospective stream of hypothetical after-tax royalty cost savings discounted at rates that reflect the rates of return appropriate for these intangible assets. The impairment charge is the excess of the assets carrying value over its fair value.

Pre-production Design and Development and Tooling Assets: The Company expenses pre-production design and development costs as incurred unless there is a contractual guarantee for reimbursement from the original equipment customer. Costs for molds, dies and other tools used to make products sold on long-term supply arrangements for which the Company has title to the assets are capitalized in property, plant and equipment and amortized to cost of sales over the shorter of the term of the arrangement or over the estimated useful lives of the assets. Costs for molds, dies and other tools used to make products sold on long-term supply arrangements for which the Company has a contractual guarantee for reimbursement or has the non-cancelable right to use the assets during the term of the supply arrangement from the customer are capitalized in prepayments and other current assets.

Prepayments and other current assets included $193 million and $142 million at December 31, 2018 and 2017, respectively, for in-process tools and dies being built for OE customers and unbilled pre-production design and

development costs.

Internal Use Software Assets: Certain costs related to the purchase and development of software used in the business operations are capitalized. Costs attributable to these software systems are amortized over their estimated useful lives based on various factors such as the effects of obsolescence, technology, and other economic factors. Additions to capitalized software development costs, including payroll and payroll-related costs for those employees directly associated with developing and obtaining the internal use software, are classified as investing activities in the consolidated statements of cash flows.

Income Taxes: Deferred tax assets and liabilities are recognized on the basis of the future tax consequences attributable to temporary differences that exist between the financial statement carrying value of assets and liabilities and the respective tax values, and net operating losses ("NOL") and tax credit carryforwards on a taxing jurisdiction basis. Deferred tax assets and

liabilities are measured using enacted tax rates that will apply in the years in which the temporary differences are expected to be recovered or paid. The effect on deferred tax assets and liabilities of a change in tax rates is recorded in the results of operations in the period that includes the enactment date under the law.

Deferred income tax assets are evaluated quarterly to determine if valuation allowances are required or should be adjusted. Valuation allowances are established in certain jurisdictions based on a more likely than not standard. The ability to realize deferred tax assets depends on the Company's ability to generate sufficient taxable income within the carryback or carryforward periods provided for in the tax law for each tax jurisdiction. The Company considers the various possible sources of taxable income when assessing the realization of its deferred tax assets. The valuation allowances recorded against deferred tax assets generated by taxable losses in certain jurisdictions will effect the provision for income taxes until the valuation allowances are released. The Company's provision for income taxes will include no tax benefit for losses incurred and no tax expense with respect to income generated in these jurisdictions until the respective valuation allowance is eliminated.

The Company records uncertain tax positions on the basis of a two-step process whereby it is determined whether it is more likely than not that the tax positions will be sustained based on the technical merits of the position, and for those tax positions that meet the more likely than not criteria, the largest amount of tax benefit that is greater than 50% likely to be realized upon ultimate settlement with the related tax authority is recognized.

The Company elected to account for Global Intangible Low-Taxed Income (“GILTI”) as a current-period expense when incurred. Therefore, the Company has not recorded deferred taxes for basis differences expected to reverse in the future periods.

Pension and other postretirement benefit plan obligations: Pensions and other postretirement employee benefit costs and related liabilities and assets are dependent upon assumptions used in calculating such amounts. These assumptions include discount rates, long term rate of return on plan assets, health care cost trends, compensation, and other factors. Actual results that differ from the assumptions used are accumulated and amortized over future periods, and accordingly, generally affect recognized expense in future periods. The cost of benefits provided by defined benefit pension and other postretirement plans is recorded in the period employees provide service. Future pension expense for certain significant funded benefit plans is calculated using an expected return on plan asset methodology.

Investments with registered investment companies, common and preferred stocks, and certain government debt securities are valued at the closing price reported on the active market on which the securities are traded. Corporate debt securities are valued by third-party pricing sources using the multi-dimensional relational model using instruments with similar characteristics. Hedge funds and the collective trusts are valued at net asset value (NAV) per share which are provided by the respective investment sponsors or investment advisers.

Revenue Recognition: The Company adopted Financial Accounting Standards Board ("FASB") Accounting Standards Update ("ASU") 2014-09 on January 1, 2018, which required it to recognize revenue when a customer obtains control rather than when substantially all risks and rewards of a good or service have been transferred. ASU 2014-09 was adopted by applying the modified retrospective method; see the Recently Adopted Accounting Standards section for additional information pertaining to the adoption of ASU 2014-09. The comparative information has not been adjusted and continues to be reported under the accounting standards in effect for those periods. The following accounting policies became effective upon the adoption of ASU 2014-09:

The Company accounts for a contract with a customer when it has approval and commitment from both parties, the rights of the parties are identified, payment terms are identified, the contract has commercial substance, and

collectability of consideration is probable.

Revenue is recognized for sales to OE and aftermarket customers when transfer of control of the related good or service has occurred. Revenue from most OE and aftermarket goods and services is transferred to customers at a point in time. Contract terms with certain OE customers results in products and services being transferred over time due to the customized nature of some of the Company's products together with contractual provisions in certain customer contracts that provide the Company with an enforceable right to payment for performance completed to date. The Company considers an input measure (e.g., costs incurred to date relative to total estimated costs at completion) as a fair measure of progress for the recognition of over time revenue associated with these customized parts. A cost measure best depicts the means of transfer of goods to the customer, which occurs as the Company incurs costs to fulfill contracts.

The customer is invoiced once transfer of control has occurred and the Company has a right to payment. Typical payment

terms vary based on the customer and the type of goods and services in the contract. The period of time between invoicing and when payment is due is not significant. Amounts billed and due from customers are classified as receivables on the consolidated balance sheets. Standard payment terms are less than one year and the Company has elected the practical expedient to not assess whether a contract has a significant financing component if the payment terms are less than one year.

Performance Obligations: The majority of the Company's customer contracts with OE and aftermarket customers are long-term supply arrangements. The performance obligations are established by the enforceable contract, which is generally considered to be the purchase order but in some cases could be the delivery release schedule. The purchase order, or related delivery release schedule, is of a duration of less than one year. As such, the Company applies the practical expedient and does not disclose information about remaining performance obligations that have original expected durations of one year or less, for which work has not yet been performed.

Rebates: The Company accrues for rebates pursuant to specific arrangements with certain customers, primarily in the aftermarket. Rebates generally provide for payments to customers based upon the achievement of specified purchase volumes and are recorded as a reduction of sales as earned by such customers.

Product returns: Certain aftermarket contracts with customers include terms and conditions that result in a customer right of return that is accounted for on a gross basis. For these contracts the Company has recorded a refund liability and return asset within "Prepayments and other current assets."

Shipping and handling costs: Shipping and handling costs associated with outbound freight after control of a product has transferred to a customer are accounted for as a fulfillment cost and are included in cost of sales in the consolidated statements of income.

Sales and sales related taxes: The Company collects and remits taxes assessed by various governmental authorities that are both imposed on and concurrent with revenue-producing transactions with its customers. These taxes may include, but are not limited to, sales, use, value-added, and some excise taxes. The collection and remittance of these taxes is reported on a net basis.

Contract Balances: Contract assets primarily relate to the Company’s rights to consideration for work completed but not billed at the reporting date on contracts with customers. The contract assets are transferred to receivables when the rights become unconditional. Contract liabilities primarily relate to contracts where advance payments or deposits have been received, but performance obligations have not yet been met, and therefore, revenue has not been recognized. There have been no impairment losses recognized related to any receivables or contract assets arising from the Company’s contracts with customers.

Engineering, Research, and Development: The Company records engineering, research, and development costs ("R&D") net of customer reimbursements as they are considered a recovery of cost.

Advertising and Promotion Expenses: The Company expenses advertising and promotional expenses as incurred and these expenses were $36 million, $40 million, and $40 million for the years ended December 31, 2018, 2017, and 2016.

Foreign currency translation: Exchange adjustments related to foreign currency transactions and translation adjustment for foreign subsidiaries whose functional currency is the U.S. dollar are reflected in the consolidated statements of income. Translation adjustments of foreign subsidiaries for which local currency is functional currency

are reflected in the consolidated balance sheets as a component of accumulated other comprehensive income (loss). Transaction gains and losses arising from fluctuations in currency exchange rates on transactions denominated in currencies other than the functional currency are recognized in earnings as incurred, except for those intercompany balances which are designated as long-term investments. The amounts recorded in cost of sales in the consolidated statements of income for foreign currency transactions included $15 million of gains for the year ended December 31, 2018, $4 million of losses for the year ended December 31, 2017 and $1 million of gains for the year ended December 31, 2016.

Asset Retirement Obligations: The Company records asset retirement obligations (ARO) when liabilities are probable and amounts can be reasonably estimated. The Company's primary ARO activities relate to the removal of hazardous building materials at its facilities.

Derivative Financial Instruments: For derivative instruments to qualify as hedging instruments, they must be designated as a fair value hedge, cash flow hedge or a hedge of a net investment in a foreign operation. Gains and losses related to a hedge are

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

either recognized in income immediately to offset the gain or loss on the hedged item or are deferred and reported as a component of accumulated other comprehensive income (loss) and subsequently recognized in earnings when the hedged item affects earnings. The change in fair value of the ineffective portion of a derivative financial instrument, determined using the hypothetical derivative method, is recognized in earnings immediately. The gain or loss related to derivative financial instruments not designated as hedges are recognized immediately in earnings. Cash flows related to hedging activities are included in the operating section of the consolidated statements of cash flows.

New Accounting Pronouncements
Adoption of New Accounting Standards
Revenue recognition: The Company adopted ASU No. 2014-09, as incorporated into Accounting Standards Codification (ASC) Topic 606, Revenue from Contracts with Customers ("ASC 606"), on January 1, 2018, using the modified retrospective application method under which the cumulative effect is recognized in equity at the date of initial application. Therefore, the comparative information has not been adjusted and continues to be reported under previous guidance. ASC 606 has been applied to all contracts at the date of initial application. The details of significant changes and quantitative effect of the changes are disclosed below.

Product returns: The Company previously recognized product returns as a reduction in revenue based on the estimated product return rate. Under ASC 606, the Company continues to recognize this liability but also recognizes the value of the inventory to be returned.

Timing of revenue recognition: The Company previously recognized revenue when title and risk of loss passed to the customer. Upon the adoption of ASC 606, there was a change in the pattern of revenue recognition for certain customized parts where the Company has a right to payment. As a result of the adoption, the revenue from these contracts is now being recognized over-time because the customized parts are considered to be assets with limited alternative use and the Company has an enforceable right to payment for work completed to date. The Company considers the costs incurred (input method) as a fair measure of progress for the over-time recognition of revenue associated with these customized parts.

The cumulative effect of the adoption was recognized as a decrease to accumulated deficit of $1 million and the changes made to the consolidated January 1, 2018 opening consolidated balance sheets for the adoption of ASC Topic 606 were as follows:

Consolidated Balance Sheets	Balance at December 31, 2017	Over-time recognition	Balance at January 1, 2018
	(Millions)		
Assets			
Inventory	$820	$ (5)	$815
Prepayments and other current assets	$288	$ 6	$294
Equity			
Accumulated deficit	$(1,009)	$ 1	$(1,008)

The following tables summarize the effects of adopting ASC Topic 606 on the Company's consolidated financial statements as of and for the year ended December 31, 2018:

December 31, 2018			
As Reported	Product returns	Over-time recognition	Balances Without

	(Millions)			Adoption of ASC Topic 606
Consolidated Balance Sheets				
Assets				
Inventory	$2,245	$—	$ 8	$2,253
Prepayments and other current assets	$590	$(44)	$ (9)	$537
Liabilities				
Accrued expenses and other current liabilities	$1,001	$(44)	$ —	$957
Equity				
Accumulated deficit	$(1,013)	$—	$ (1)	$(1,014)

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

	Year Ended December 31, 2018			
	As Reported	Product returns	Over-time recognition	Balances Without Adoption of ASC Topic 606
	(Millions)			
Consolidated Statements of Income				
Revenues				
Net sales and operating revenues	$11,763	$ 2	$ 3	$ 11,768
Cost and expenses				
Cost of sales (exclusive of depreciation and amortization)	$10,071	$ (2)	$ (3)	$ 10,066

For the year ended December 31, 2018, there would have been no change to "Net cash provided from (used by) operating activities" under prior accounting principles.

Income taxes: In October 2016, the FASB issued ASU 2016-16, Income Taxes—Intra Entity Transfers of Assets Other Than Inventory (Topic 740). The new standard changes the accounting for income taxes when a company transfers certain tangible and intangible assets, such as equipment or intellectual property, between entities in different tax jurisdictions. The new standard does not change the current accounting for the income taxes related to transfers of inventory. This standard is effective for the Company for its financial statements issued for annual periods beginning after December 15, 2017, and interim periods within those annual periods. The Company adopted this ASU on January 1, 2018 using the modified retrospective method. The cumulative effect of the adoption was recognized as an increase to accumulated deficit of $1 million.

Retirement Benefits: Effective January 1, 2018, the Company adopted FASB ASU 2017-07, Retirement Benefits. As a result of adoption, the non-service cost components of net periodic pension and postretirement benefit cost previously presented in cost of sales and selling, general, and administrative expense have been reclassified to non-service pension and postretirement benefit cost. These financial statements have been retrospectively adjusted to reflect this change in accounting principle for the years ended December 31, 2017 and 2016.

The following tables summarize the effects of adopting the new standard on our consolidated financial statements:

	Year Ended December 31, 2017		
	Prior to Change in Accounting Principle	Effective of Accounting Change	After Change in Accounting Principle
	(Millions)		
Consolidated Statements of Income			
Cost of Sales	$7,815	$ (3)	$ 7,812
Selling, general, and administrative	$650	$ (12)	$ 638
Non-service pension and postretirement benefit costs	$—	$ 16	$ 16
Other (income) expense	$(1)	$ (1)	$ (2)

Year Ended December 31, 2016

	Prior to Change in Accounting Principle	Effective of Accounting Change	After Change in Accounting Principle
	(Millions)		
Consolidated Statements of Income			
Cost of Sales	$7,133	$ (7)	$ 7,126
Selling, general, and administrative	$590	$ (76)	$ 514
Non-service cost pension and other postretirement benefits	$—	$ 84	$ 84
Other expense	$—	$ (1)	$ (1)

Deferred Purchase Price: Effective January 1, 2018, the Company adopted ASU 2016-15, Statement of Cash Flow—Classification of certain cash receipts and cash payments (Topic 230). This ASU addresses eight specific cash flow issues with the objective of reducing the existing diversity in practice. The retrospective adoption of this ASU resulted in the reclassification of cash received to settle the deferred purchase price of factored receivables to an investing activity in the

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

consolidated statement of cash flows. Prior to adoption this amount would have been recorded as an operating activity in the consolidated statement of cash flows. The Company also now presents the transfer of trade receivables in exchange for a beneficial interest in the factored receivables as a non-cash investing activity.

Restricted Cash: Effective January 1, 2018, the Company adopted ASU 2016-18, Statement of Cash Flows—Restricted Cash (Topic 230) to eliminate diversity in practice in the presentation of restricted cash and restricted cash equivalents in the statement of cash flows. Under this standard, the change in restricted cash is no longer presented as an investing activity in the consolidated statement of cash flows.

The following tables summarize the effects of adopting ASU 2016-18 and ASU 2016-15 on our consolidated statements of cash flows for the years ended December 31, 2017 and 2016:.

	Year Ended December 31, 2017			
	Prior to Change in Accounting Principle	Effect of ASU 2016-18	Effect of ASU 2016-15	After Change in Accounting Principle
	(Millions)			
Consolidated Statements of Cash Flows				
Decrease (increase) in receivables	$31	$ —	$ (112)	$ (81)
Net cash provided by operating activities	629	—	(112)	517
Change in restricted cash	(1)	1	—	—
Proceeds from deferred purchase price of factored receivables	—	—	112	112
Net cash used by investing activities	(413)	1	112	(300)
Decrease in cash, cash equivalents and restricted cash	(32)	1	—	(31)
Cash, cash equivalents and restricted cash, January 1	347	2	—	349
Cash, cash equivalents and restricted cash, December 31	$315	$ 3	$ —	$ 318

	Year Ended December 31, 2016			
	Prior to Change in Accounting Principle	Effect of ASU 2016-18	Effect of ASU 2016-15	After Change in Accounting Principle
	(Millions)			
Consolidated Statements of Cash Flows				
Increase in receivables	$(215)	$ —	$ (110)	$ (325)
Net cash provided by operating activities	484	—	(110)	374
Change in restricted cash	(1)	1	—	—
Proceeds from deferred purchase price of factored receivables	—	—	110	110
Net cash used by investing activities	(340)	1	110	(229)
Increase in cash, cash equivalents and restricted cash	60	1	—	61
Cash, cash equivalents and restricted cash, January 1	287	1	—	288
Cash, cash equivalents and restricted cash, December 31	$347	$ 2	$ —	$ 349

Accounting Standards Issued But Not Yet Adopted

Intangibles: In August 2018, the FASB issued ASU 2018-15, Intangibles-Goodwill and Other-Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract. The amendments in this update align the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). The accounting for the service element of a hosting arrangement that is a service contract is not affected by the amendments in this update. The amendments in this update are effective for interim and annual periods for the Company beginning on January 1, 2020, with early adoption permitted. The amendments in this update should be applied either retrospectively or prospectively to all implementation costs incurred after the date of adoption. The Company is currently evaluating the potential effect of this new guidance on its consolidated financial statements.

Retirement benefits: In August 2018, the FASB issued ASU 2018-14, Compensation-Retirement Benefits-Defined Benefit Plans-General (Subtopic 715-20). The amendments in this update remove disclosures that no longer are considered cost

beneficial, clarify the specific requirements of disclosures, and add disclosure requirements identified as relevant. The amendments in this update are effective for fiscal years ending after December 15, 2020 with early adoption permitted. The Company is currently evaluating the potential effect of this new guidance on its consolidated financial statements.

Fair value measurements: In August 2018, the FASB issued ASU No. 2018-13, Fair Value Measurement (Topic 820). The new guidance modifies disclosure requirements related to fair value measurement. The amendments in this ASU are effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. Implementation on a prospective or retrospective basis varies by specific disclosure requirement. Early adoption is permitted. The standard also allows for early adoption of any removed or modified disclosures upon issuance of this ASU while delaying adoption of the additional disclosures until their effective date. The Company is currently evaluating the potential effect of this new guidance on its consolidated financial statements.

Comprehensive income: In February 2018, the FASB issued ASU 2018-02, Income Statement—Reporting Comprehensive Income (Topic 220). The amendments in this update allow a reclassification from accumulated other comprehensive income (loss) to accumulated deficit for stranded tax effects resulting from the Tax Cuts and Jobs Act ("TCJA"). Consequently, the amendments allow for an election to eliminate the stranded tax effects resulting from the TCJA and will improve the usefulness of information reported to financial statement users. However, because the amendments only relate to the reclassification of the income tax effects of the TCJA, the underlying guidance that requires the effect of a change in tax laws or rates be included in income from continuing operations is not affected. The amendments in this update also require certain disclosures about stranded tax effects. The amendments in this update are effective for all entities for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years. The Company has elected not to adopt the optional reclassification.

Leases: In February 2016, the FASB issued ASU 2016-02, Leases (Topic 842). This update supersedes the lease requirements in Topic 840, Leases. The objective of Topic 842 is to establish the principles that lessees and lessors shall apply to report useful information to users of financial statements about the amount, timing, and uncertainty of cash flow arising from a lease. For public business entities, the standard is effective for financial statements issued for annual periods beginning after December 15, 2018, and interim periods within those annual periods. The Company will adopt this update on January 1, 2019 using the modified retrospective method without the recasting of comparative periods' financial information, as permitted by the transition guidance.

The Company is finalizing its implementation efforts including final review of lease arrangements and completion of its system implementations. The Company is still quantifying the effect of adoption but does not anticipate a material effect to the consolidated statements of income; however, it does expect a material effect on the consolidated balance sheets as it recognizes the right-of-use assets and liabilities for operating leases.

The Company intends to adopt the package of practical expedients that allow companies to not reassess and will carry forward historical conclusions related to contracts that contain leases, existing lease classification, and initial direct costs. It does not intend to adopt the hindsight practical expedient and has also made an accounting policy election to exempt leases with an initial term of twelve months or less from balance sheets recognition. Instead, short-term leases will be expensed over the lease term. As a part of the implementation efforts, the Company has reviewed its internal control structure and does not anticipate its internal control framework will materially change, but rather existing internal controls will be modified and augmented, as necessary.

3. Acquisitions and Divestitures

Acquisition of Federal-Mogul
On October 1, 2018, the Company closed on the acquisition of all of the interests in Federal-Mogul (the "Acquisition") pursuant to the Membership Interest Purchase Agreement, dated as of April 10, 2018 (the "Purchase Agreement"), by and among the Company, Federal-Mogul, American Entertainment Properties Corp. ("AEP" and, together with certain affiliated entities, the "Sellers") and Icahn Enterprises L.P. ("IEP"). Total consideration was approximately $3.7 billion. Following the completion of the Acquisition, Federal-Mogul was merged with and into the Company, with the Company continuing as the surviving company.

Following the closing of the Acquisition, the Company has agreed to use its reasonable best efforts to pursue the separation of the combined company's powertrain technology business and its aftermarket and ride performance business into two new independent, publicly traded companies in a spin-off transaction that is expected to be treated as a tax-free reorganization for U.S. federal income tax purposes.

At the effective date of the Acquisition, the Company's certificate of incorporation was amended and restated (the "Amended and Restated Certificate of Incorporation") in order to create a new class of non-voting convertible common stock of the Company called "Class B Non-Voting Common Stock" ("Class B Common Stock") with 25,000,000 shares authorized, and to reclassify the Company's existing common stock as "Class A Voting Common Stock" ("Class A Common Stock" and, together with the Class B Common Stock, the “common stock”). See Note 17, Shareholders' Equity for additional information on the conversion features of the Class B Common Stock. On the same date, the Company also entered into a new credit facility in connection with the Acquisition. The new credit facility includes $4.9 billion of total debt financing, consisting of a five-year $1.5 billion revolving credit facility, a five-year $1.7 billion term loan A facility and a seven-year $1.7 billion term loan B facility. See Note 11, Debt and Other Financing Arrangements, for additional information.

Under the Amended and Restated Certificate of Incorporation, the authorized number of shares was increased from 185,000,000 shares, divided into 135,000,000 shares of common stock, par value $0.01, and 50,000,000 shares of preferred stock, par value $0.01, to 250,000,000 shares, divided into 175,000,000 shares of Class A Common Stock, 25,000,000 shares of Class B Common Stock and 50,000,000 shares of preferred stock, par value $0.01.

The Company (i) paid to AEP an aggregate amount in cash equal to $800 million (the “Cash Consideration”) and (ii) issued and delivered to AEP an aggregate of 29,444,846 shares of common stock at $41.99 per share (the “Stock Consideration”). The $1.2 billion of common stock was comprised of: (a) 5,651,177 shares of Class A Common Stock, par value $0.01 equal to 9.9 percent of the aggregate number of shares of Class A Common Stock issued and outstanding immediately following the closing of the Acquisition, and (b) 23,793,669 shares of newly created Class B Common Stock, par value $0.01. The remaining consideration of approximately $1.7 billion was comprised primarily of the repayments of certain Federal-Mogul debt obligations.

Advisory costs associated with the Acquisition were $68 million for the year ended December 31, 2018 and were recognized as a component of selling, general, and administrative expenses in the consolidated statements of income.

The following table summarizes the purchase price (in millions, except for share data):

Tenneco shares issued for purchase of Federal-Mogul	29,444,846
Tenneco share price at October 1, 2018	$ 41.99
Fair value of the Stock Consideration	1,236
Cash Consideration[1]	811
Repayment of Federal-Mogul debt and accrued interest [2]	1,660
Total consideration	$ 3,707

[1] Cash consideration also included $11 million in advisory fees paid to a third-party.

[2] Portion of the proceeds from the issuance of the $4.9 billion new credit facility that was used to repay Federal-Mogul’s term loan and revolver loan of $1,455 million and $200 million, respectively, and the related accrued interest of $5 million.

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The following table summarizes the preliminary fair values of assets acquired and liabilities assumed as of the acquisition date:

	(Millions)
Cash, cash equivalents and restricted cash	$ 277
Customer notes and accounts receivable	1,258
Other receivables	62
Inventories	1,551
Prepayments and other current assets	198
Property, plant and equipment	1,711
Long-term receivables	48
Goodwill	825
Intangibles	1,530
Investments in nonconsolidated affiliates	528
Deferred income taxes	166
Other assets	55
Total assets acquired	8,209
Short-term debt, including current maturities of long-term debt	130
Accounts payable	957
Accrued compensation and employee benefits	231
Accrued income taxes	49
Accrued expenses and other current liabilities	522
Long-term debt	1,315
Deferred income taxes	56
Pension and postretirement benefits	879
Deferred credits and other liabilities	124
Total liabilities assumed	4,263
Redeemable noncontrolling interests	96
Noncontrolling interests	143
Net assets and noncontrolling interests acquired	$ 3,707

The preliminary allocation of the purchase price to the assets acquired and liabilities assumed, including the residual amount recognized as goodwill, is based upon estimated information and is subject to change within the measurement period. The measurement period is a period not to exceed one year from the acquisition date during which the Company may adjust estimated or provisional amounts recorded during purchase accounting if new information is obtained about facts and circumstances that existed as of the acquisition date that, if known, would have resulted in revised estimated values of those assets or liabilities as of that date. Measurement period adjustments are recorded in the period identified. Any adjustments to amounts recorded in purchase accounting that do not qualify as measurement period adjustments are included in earnings in the period identified.

The fair values of the assets acquired and liabilities assumed are based on preliminary estimates and assumptions, as well as other information compiled by management, including valuations that utilize customary valuation procedures and techniques. While the Company believes these preliminary estimates provide a reasonable basis for estimating the fair value of the assets acquired and liabilities assumed, it will continue to evaluate available information prior to finalization of the amounts. The primary areas of the preliminary purchase price allocation that are not yet finalized relate to the fair value of property, plant and equipment; intangible assets; unconsolidated affiliates; deferred income

tax assets and liabilities; redeemable noncontrolling interests; and noncontrolling interests.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Goodwill and other assets and liabilities are reflected in the Powertrain and Motorparts segments and are located in all geographic areas. The goodwill resulting from this Acquisition consists largely of the Company's expected future economic benefits to arise from expected future product sales and synergies from combining Federal-Mogul with the Company's existing portfolio of products. Goodwill of $388 million was allocated to the Powertrain segment and $437 million was allocated to the Motorparts segment. None of the goodwill is deductible for tax purposes. Other intangible assets acquired include the following:

	Estimated Fair Value (Millions)	Weighted-Average Useful Lives
Definite-lived intangible assets:		
Customer platforms and relationships	$ 964	10 years
Technology rights	69	10 years
Packaged kits know-how	36	10 years
Licensing agreements	66	4.5 years
Land use rights	30	42.8 years
Total definite-lived intangible assets	1,165	10.5 years
Indefinite-lived intangible assets:		
Trade names and trademarks	365	
Total	$ 1,530	

The Company also recorded a $152 million step-up of inventory to its fair value as of the acquisition date based on the preliminary valuation and recognized $105 million as a non-cash charge to cost of goods sold during the fourth quarter of 2018 related to the amortization of this step-up, as the acquired inventory was sold. The Company expects to recognize the remaining amortization of the inventory step-up during 2019.

The Company's consolidated statements of income for the year ended December 31, 2018 included net sales and operating revenues of $1,886 million and net loss of $69 million associated with the operating results of Federal-Mogul from October 1, 2018 to December 31, 2018.

Pro Forma Results (Unaudited)

The following table summarizes, on a pro forma basis, the combined results of operations of the Company and Federal-Mogul business as though the Acquisition and the related financing had occurred as of January 1, 2017. The pro forma results are not necessarily indicative of either the actual consolidated results had the acquisition of Federal-Mogul occurred on December 31, 2016 or of future consolidated operating results.

	For the Year Ended December 31	
	2018	2017
	(In millions, except per share amounts)	
Net sales and operating revenues	$17,860	$17,153
Earnings before income taxes and noncontrolling interests	$488	$235
Net income attributable to Tenneco Inc.	$275	$372
Basic earnings per share of common stock	$3.41	$4.52

Diluted earnings per share of common stock	$3.40	$4.51

These pro forma amounts have been calculated after applying the Company's accounting policies and the results presented above primarily reflect: (i) depreciation adjustments relating to fair value adjustments to property, plant, and equipment; (ii) amortization adjustments relating to fair value estimates of intangible assets; (iii) incremental interest expense, net on assumed indebtedness, the new credit facility, debt issuance costs, and fair value adjustments to debt; and (iv) cost of goods sold adjustments relating to fair value adjustments to inventory. Pro forma adjustments described above have been tax affected using the Company's effective rate during the respective periods.

In 2018, the Company incurred $96 million of acquisition related costs. These expenses are included in Selling, general, and administrative on the Company's consolidated statements of income for the year ended December 31, 2018. These expenses, as

well as $4 million of expenses incurred by Federal-Mogul in 2018 prior to the acquisition, are reflected in the pro forma earnings for the year ended December 31, 2017, in the table above.

Other Matters Related to the Acquisition

On March 3, 2017, and May 1, 2017, certain purported former stockholders of Federal-Mogul Holdings Corporation ("FMHC") filed a petition in the Delaware Court of Chancery seeking an appraisal of the value of common stock they claim to have held at the time of the January 23, 2017 merger of IEH FM Holdings, LLC into FMHC. IEH FM Holdings, LLC was a wholly owned subsidiary of American Entertainment Properties Corp. and a subsidiary of Icahn Enterprises L.P. The two cases were consolidated on May 10, 2017 into: "In re Appraisal of Federal-Mogul Holdings LLC, C.A. No. 2017-0158-AGB."

Federal-Mogul received a capital contribution of $56 million on June 29, 2018 from its then-parent, IEP, in connection with this matter. At October 1, 2018, Federal-Mogul's litigation reserve was $55 million, along with accrued interest of $6 million, which was assumed as part of the Acquisition. On October 19, 2018, the Company reached an agreement with the plaintiffs to settle their claims for $12.01 per share, inclusive of interest payable, or an aggregate of approximately $61 million. The Company paid this settlement in the fourth quarter of 2018.

Assets Held for Sale

The Company classifies assets and liabilities as held for sale ("disposal group") when management, having the authority to approve the action, commits to a plan to sell the disposal group, the sale is probable within one year, and the disposal group is available for immediate sale in its present condition. The Company also considers whether an active program to locate a buyer has been initiated, whether the disposal group is marketed actively for sale at a price that is reasonable in relation to its current fair value, and whether actions required to complete the plan indicate it is unlikely significant changes to the plan will be made or the plan will be withdrawn.

In December 2018, the Company entered into a stock and asset purchase agreement to sell certain assets and liabilities related to its wipers business in the Motorparts segment for a sale price of $29 million, subject to adjustment based on terms of the sale agreement. As of December 31, 2018, proceeds from the sale would have been $22 million. The related assets and liabilities were classified as held for sale as of December 31, 2018. The transaction closed on March 1, 2019.

There were no disposal groups classified as held for sale as of December 31, 2017. The assets and liabilities classified as held for sale as of December 31, 2018 were as follows:

	December 31 2018 (Millions)
Assets	
Inventories	$ 33
Other current assets	5
Long-lived assets	23
Total assets held for sale	$ 61
Liabilities	
Accounts payable	$ 21
Accrued liabilities	7
Other liabilities	11
Total liabilities held for sale	$ 39

The assets and liabilities held for sale are recorded in “Prepayments and other current assets” and “Accrued expenses and other current liabilities” in the consolidated balance sheets as of December 31, 2018.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

4. Restructuring Charges and Asset Impairments, Net

For the years ended December 31, 2018, 2017, and 2016, restructuring charges, net, by segment, is as follows:

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Clean Air	$14	$ 23	$ 6
Ride Performance	48	16	13
Aftermarket	16	7	9
Powertrain	(2)	—	—
Motorparts	31	—	—
Other	5	1	2
	$112	$ 47	$ 30
These amounts are classified in the consolidated statements of income as follows:			
Cost of sales	$66	$ 41	$ 17
Engineering, research, and development	4	—	1
Selling, general, and administrative	40	6	12
Other expense	2	—	—
	$112	$ 47	$ 30

For the years ended December 31, 2018, 2017, and 2016, asset impairments, by segment, is as follows:

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Clean Air	$ —	$ 2	$ 1
Ride Performance	6	1	2
Aftermarket	—	—	3
Other	2	—	—
	$ 8	$ 3	$ 6
These amounts are classified in the consolidated statements of income as follows:			
Cost of sales	$ 3	$ —	$ —
Selling, general, and administrative	2	—	—
Depreciation and amortization	3	3	4
Other expense	—	—	2
	$ 8	$ 3	$ 6

In 2018, the Company incurred charges for the following items:

- The Company incurred $25 million in restructuring and related costs, related to the accelerated move of the Beijing Ride Performance plant. The Company anticipates the move out of its Beijing plant will be completed by the first quarter of 2019.
- The Company incurred $10 million in restructuring charges related to headcount reductions at a Clean Air manufacturing plant in Germany.
-

In October, 2018, the Company announced a plan to close its ride performance plants in Owen Sound, Ontario and Hartwell, Georgia as part of an initiative to realign its manufacturing footprint to enhance operational efficiency and respond to changing market conditions and capacity requirements. The Company expects to complete the closure of the two facilities near the end of the second quarter of 2020. The Company recorded charges of $24 million in 2018, including asset write-downs of $6 million. The charges included severance payments to employees, the cost of decommissioning equipment, and other costs associated with this action.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

- The Company incurred a $45 million charge related to a restructuring plan designed to achieve a portion of the synergies the Company anticipates achieving in connection with the acquisition of Federal-Mogul. Pursuant to the plan, the Company will reduce its headcount globally across all segments. The Company began implementing headcount reductions in January 2019 and these actions will continue through 2019. The Company's acquisition of Federal-Mogul is discussed further in Note 3, Acquisitions and Divestitures.

- The Company incurred an additional $16 million in restructuring and related costs, including asset write-downs of $2 million, for cost improvement initiatives at various other operations around the world.

In 2017, the Company incurred charges for the following items:

- On June 29, 2017, the Company announced a restructuring initiative to close its Clean Air manufacturing plant in O'Sullivan Beach, Australia and downsize its Ride Performance plant in Clovelly Park, Australia when General Motors and Toyota ended vehicle production in the country in October 2017. All such restructuring activities related to this initiative were completed in 2018. The Company recorded total charges related to this initiative of $21 million in 2017 including asset write-downs of $2 million. The charges included severance payments to employees, the cost of decommissioning equipment, a lease termination payment and other costs associated with this action.

- In the fourth quarter of 2017, the Company began to accelerate a required move of its Beijing Ride Performance plant outside of Beijing area. The Company incurred $6 million of restructuring and related costs due to this relocation.

- The Company recognized a $10 million charge, including asset write-downs of $1 million, related to the planned closing of its Clean Air plant in Ghent, Belgium due to the scheduled end of production on a customer platform in 2020.

- The Company incurred an additional $13 million in restructuring and related costs for cost improvement initiatives at various other operations around the world.

In 2016, the Company incurred $36 million in restructuring and related costs including asset write-downs of $6 million, primarily related to manufacturing footprint improvements in North America, headcount reduction and cost improvement initiatives in Europe, China, South America and Australia.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Restructuring Reserve Rollforward

Amounts related to activities that were charged to restructuring reserves, including costs incurred to support future structural cost reductions, by reportable segments are as follows:

	Reportable Segments							
	Clean Air	Ride Performance	Aftermarket	Powertrain	Motorparts	Total Reportable Segments	Other	Total
	(Millions)							
Balance at December 31, 2015	$2	$ 24	$ 4	$ —	$ —	$ 30	$ —	$30
Provisions	6	13	9	—	—	28	2	30
Payments	(6)	(31)	(7)	—	—	(44)	(1)	(45)
Balance at December 31, 2016	2	6	6	—	—	14	1	15
Provisions	23	16	7	—	—	46	1	47
Payments	(12)	(16)	(9)	—	—	(37)	(2)	(39)
Foreign currency	1	1	—	—	—	2	—	2
Balance at December 31, 2017	14	7	4	—	—	25	—	25
Federal-Mogul Acquisition	—	—	—	22	15	37	—	37
Provisions	14	48	16	1	31	110	5	115
Held for sale	—	—	—	—	(2)	(2)	—	(2)
Revisions to estimates	—	—	—	(3)	—	(3)	—	(3)
Payments	(10)	(35)	(12)	(5)	(4)	(66)	(2)	(68)
Foreign currency	(1)	—	—	—	—	(1)	—	(1)
Balance at December 31, 2018	$17	$ 20	$ 8	$ 15	$ 40	$ 100	$ 3	$103

The following table provides a summary of the Company's consolidated restructuring liabilities and related activity for each type of exit costs:

	Employee Costs	Facility Closure and Other Costs	Total
	(Millions)		
Balance at December 31, 2015	$20	$ 10	$30
Provisions	19	11	30
Revisions to estimates	(15)	15	—
Payments	(16)	(29)	(45)
Balance at December 31, 2016	8	7	15
Provisions	31	16	47
Payments	(22)	(17)	(39)
Foreign currency	2	—	2
Balance at December 31, 2017	19	6	25
Federal-Mogul Acquisition	37	—	37
Provisions	90	25	115
Held for sale	(2)	—	(2)
Revisions to estimates	(4)	1	(3)
Payments	(41)	(27)	(68)
Foreign currency	(1)	—	(1)

Balance at December 31, 2018	$98	$ 5	$103

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TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

5. Inventories

At December 31, 2018 and 2017, inventory by major classification was as follows:

	December 31	
	2018	2017
	(Millions)	
Finished goods	$1,116	$300
Work in process	562	268
Raw materials	457	178
Materials and supplies	110	74
Total inventories	$2,245	$820

6. Property, Plant and Equipment, Net

The components of property, plant and equipment—net were as follows:

	December 31		Useful Life
	2018	2017	
	(Millions)		
Land	$293	$20	—
Buildings and improvements	1,023	615	10 to 50 years
Machinery, equipment and tooling	4,041	2,992	3 to 25 years
Capitalized software	378	346	3 to 12 years
Other, including construction in progress	568	396	—
Property, plant and equipment, cost	6,303	4,369	
Less: Accumulated depreciation and amortization	(2,802)	(2,678)	
Property, plant and equipment, net	$3,501	$1,691	

Depreciation and amortization related to property, plant and equipment was $313 million, $223 million and $210 million for the years ended December 31, 2018, 2017 and 2016, respectively.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

7. Goodwill and Other Intangible Assets

At December 31, 2018 and 2017, goodwill consists of the following:

	December 31, 2018					
	Clean Air Segment	Ride Performance Segment	Aftermarket Segment	Powertrain	Motorparts	Total
	(Millions)					
Gross carrying amount, January 1	$23	$ 156	$ 229	$ —	$ —	$408
Acquisition of Federal-Mogul [1]	—	—	—	388	437	825
Currency translation	(1)	(1)	—	—	—	(2)
Gross carrying amount, December 31	22	155	229	388	437	1,231
Accumulated impairment loss, January 1	$—	$ (140)	$ (219)	$ —	$ —	$(359)
Impairment	—	(3)	—	—	—	(3)
Currency translation	—	—	—	—	—	—
Accumulated impairment loss, December 31	—	(143)	(219)	—	—	(362)
Net carrying value, December 31	$22	$ 12	$ 10	$ 388	$ 437	$869

	December 31, 2017					
	Clean Air Segment	Ride Performance Segment	Aftermarket Segment	Powertrain	Motorparts	Total
	(Millions)					
Gross carrying amount, January 1	$21	$ 155	$ 229	$ —	$ —	$405
Currency translation	2	1	—	—	—	3
Gross carrying amount, December 31	23	156	229	—	—	408
Accumulated impairment loss, January 1	$—	$ (133)	$ (215)	$ —	$ —	$(348)
Impairment	—	(7)	(4)	—	—	(11)
Currency translation	—	—	—	—	—	—
Accumulated impairment loss, December 31	—	(140)	(219)	—	—	(359)
Net carrying value, December 31	$23	$ 16	$ 10	$ —	$ —	$49

[1] The acquisition on October 1, 2018 of Federal-Mogul resulted in goodwill of $825 million. See Note 3, Acquisitions and Divestitures for additional information.

As a result of the goodwill impairment evaluation in the fourth quarter of 2018, the estimated fair value of the Ride Performance North America reporting unit was lower than its carrying value. Accordingly, a full goodwill impairment charge of $3 million for Ride Performance was recorded for the year ended December 31, 2018.

As a result of the goodwill impairment evaluation in the fourth quarter of 2017, the estimated fair value of the Europe and South America Ride Performance and Aftermarket reporting units were lower than their carrying value. Accordingly, a full goodwill impairment charge of $7 million for Ride Performance and $4 million for Aftermarket was recorded for the year ended December 31, 2017.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

At December 31, 2018 and 2017, the Company's intangible assets consist of the following:

		December 31, 2018			December 31, 2017		
	Useful Lives	Gross Carrying Value	Accumulated Amortization	Net Carrying Value	Gross Carrying Value	Accumulated Amortization	Net Carrying Value
		(Millions)					
Definite-lived intangible assets:							
Customer relationships and platforms	10 years	$964	$ (24)	$ 940	$—	$ —	$ —
Customer contract	10 years	8	(5)	3	8	(5)	3
Patents	10 to 17 years	1	(1)	—	1	(1)	—
Technology rights	10 to 30 years	98	(27)	71	29	(23)	6
Packaged kits know-how	10 years	36	(1)	35	—	—	—
Licensing agreements	3 to 5 years	66	(3)	63	—	—	—
Land use rights	28 to 46 years	44	(2)	42	15	(2)	13
		1,217	(63)	1,154	53	(31)	22
Indefinite-lived intangible assets:							
Trade names and trademarks		365	—	365	—	—	—
Total		$1,582	$ (63)	$ 1,519	$53	$ (31)	$ 22

Included in the table above are definite-lived and indefinite-lived intangible assets of $1,165 million and $365 million, respectively, identified in connection with the October 1, 2018 acquisition of Federal-Mogul. See Note 3, Acquisitions and Divestitures for additional information.

Amortization of intangibles amounted to $32 million in 2018 and $3 million in both 2017 and 2016, and are included in the consolidated statements of income caption "Depreciation and amortization."

The expected future amortization expense for the Company's definite-lived intangible assets is as follows:

	2019	2020	2021	2022	2023	2024 and thereafter	Total
	(Millions)						
Expected Amortization Expense	$124	$125	$124	$119	$116	$ 546	$1,154

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

8. Investment in Nonconsolidated Affiliates

The Company maintains investments in several nonconsolidated affiliates, which are primarily located in China, Korea, Turkey, and the U.S. The Company generally equates control to ownership percentage whereby investments more than 50% owned are consolidated.

As of December 31, 2018 and 2017, the Company's investment in affiliates was $544 million and $2 million, respectively.
The Company's ownership interests in affiliates, not including the acquisition of Federal-Mogul, accounted for under the equity method is as follows:

	Year Ended December 31		
	2018	2017	2016
Futaba Tenneco U.K. Ltd. (UK)	— %	— %	49.0%
Montagewerk Abgastechnik Emden GmbH (Germany)	50.0%	50.0%	50.0%

The Company sold its share of Futaba Tenneco U.K. Limited on April 28, 2017. Additionally, the Company acquired the following ownership interests accounted for under the equity method as a result of the acquisition of Federal-Mogul:

	Year Ended December 31
	2018
Anqing TP Goetze Piston Ring Company Limited (China)	35.7 %
Anqing TP Powder Metallurgy Co., Ltd (China)	20.0 %
Dongsuh Federal-Mogul Industrial Co. Ltd. (Korea)	50.0 %
Farloc Argentina SAIC Y F (Argentina)	23.9 %
Federal-Mogul Powertrain Otomotiv A.S. (Turkey)	50.0 %
Federal-Mogul TP Liner Europe Otomotiv Ltd. Sti. (Turkey)	25.0 %
Federal-Mogul TP Liners, Inc. (USA)	46.0 %
Frenos Hidraulicos Automotrices, S.A. de C.V. (Mexico)	49.0 %
JURID do Brasil Sistemas Automotivos Ltda. (Brazil)	19.9 %
KB Autosys Co., Ltd. (Korea)	33.6 %

The following table represents amounts reflected in the Company's consolidated financial statements related to nonconsolidated affiliates:

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Equity earnings (losses) of nonconsolidated affiliates, net of tax	$ 18	$ (1)	$ —
Cash dividends received from nonconsolidated affiliates	$ 2	$ —	$ —

At December 31, 2018, the carrying amount of the Company's investments in nonconsolidated affiliates accounted for under the equity method exceeded its share of the underlying net assets by $207 million. This is based on the preliminary estimate of the fair value performed as part of the Acquisition and is subject to allocation between identifiable tangible, intangible assets, and goodwill. This amount is subject to change as part of finalizing purchase accounting related to the Acquisition.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

The following tables present summarized aggregated financial information of the Company's nonconsolidated affiliates as of and for the period ended December 31, 2018:

Statements of Income	Otomotiv A.S.	Anqing TP Goetze	Other	Total
	(Millions)			
Sales	$92	$ 41	$137	$270
Gross profit	$23	$ 13	$33	$69
Income from continuing operations	$26	$ 13	$10	$49
Net income	$22	$ 12	$8	$42

Balance Sheets	Otomotiv A.S.	Anqing TP Goetze	Other	Total
	(Millions)			
Current assets	$129	$ 164	$249	$542
Noncurrent assets	$300	$ 132	$200	$632
Current liabilities	$70	$ 40	$131	$241
Noncurrent liabilities	$82	$ —	$11	$93

See Note 21, Related Party Transactions for additional information on balances and transactions with equity method investments.

9. Derivatives and Hedging Activities

The Company is exposed to market risk, such as fluctuations in foreign currency exchange rates, commodity prices, equity compensation liabilities, and changes in interest rates, which may result in cash flow risks. For exposures not offset within its operations, the Company enters into various derivative transactions pursuant to its risk management policies, which prohibit holding or issuing derivative financial instruments for speculative purposes. Designation of derivative instruments is performed on a transaction basis to support hedge accounting. The changes in fair value of these hedging instruments are offset in part or in whole by corresponding changes in the fair value or cash flows of the underlying exposures being hedged. The Company assesses the initial and ongoing effectiveness of its hedging relationships in accordance with its documented policy.

Foreign Currency Risk
The Company manufactures and sells its products in North America, South America, Asia, Europe, and Africa. As a result, the Company's financial results could be significantly affected by factors such as changes in foreign currency exchange rates or weak economic conditions in foreign markets in which the Company manufactures and sells its products. The Company generally tries to use natural hedges within its foreign currency activities, including the matching of revenues and costs, to minimize foreign currency risk. Where natural hedges are not in place, the Company considers managing certain aspects of its foreign currency activities and larger transactions through the use of foreign currency options or forward contracts. Principal currencies hedged have historically included the U.S. dollar, euro, British pound, Polish zloty, and Mexican peso.

Concentrations of Credit Risk
Financial instruments including cash equivalents and derivative contracts expose the Company to counterparty credit risk for non-performance. The Company's counterparties for cash equivalents and derivative contracts are banks and

financial institutions that meet the Company's requirement of high credit standing. The Company's counterparties for derivative contracts are substantial investment and commercial banks with significant experience using such derivatives. The Company manages its credit risk through policies requiring minimum credit standing and limiting credit exposure to any one counterparty and through monitoring counterparty credit risks. The Company's concentration of credit risk related to derivative contracts at December 31, 2018 and 2017 is not material.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Other
The Company presents its derivative positions and any related material collateral under master netting agreements on a net basis. For derivatives designated as cash flow hedges, changes in the time value are excluded from the assessment of hedge effectiveness. Unrealized gains and losses associated with ineffective hedges, determined using the hypothetical derivative method, are recognized in “Other (income) expense, net.” Derivative gains and losses included in accumulated other comprehensive loss for effective hedges are reclassified into operations upon recognition of the hedged transaction. Derivative gains and losses associated with undesignated hedges are recognized in “Other (income) expense, net” for outstanding hedges and “Cost of sales” or “Other (income) expense, net” upon hedge maturity.

Derivative Instruments
Foreign currency forward contracts — The Company enters into foreign currency forward purchase and sale contracts to mitigate its exposure to changes in exchange rates on certain intercompany and third-party trade receivables and payables. In managing its foreign currency exposures, the Company identifies and aggregates existing offsetting positions and then hedges residual exposures through third-party derivative contracts. The gain or loss on these contracts is recorded as foreign currency gains (losses) within cost of sales in the consolidated statements of income. The fair value of foreign currency forward contracts are recorded in "Prepayments and other current assets" or "Accrued expenses and other current liabilities" in the consolidated balance sheets. The fair value of the Company's foreign currency forward contracts was a net asset position of less than $1 million at December 31, 2018 and a net liability position of less than $1 million at December 31, 2017.

The following table summarizes by major currency the notional amounts for foreign currency forward purchase and sale contracts as of December 31, 2018 (all of which mature in 2019):

		Notional Amount in Foreign Currency (Millions)	
Canadian dollars	—Sell	(2	)
European euro	—Purchase	1	
	—Sell	(8	)
Polish zloty	—Purchase	35	
Mexican pesos	—Purchase	211	
U.S. dollars	—Purchase	2	
	—Sell	(11	)

Cash-settled Share Swap Transactions — In the second quarter of 2017, the Company entered into an equity swap agreement. The Company selectively uses cash-settled share swaps to reduce market risk associated with its deferred compensation liabilities. These equity deferred compensation liabilities increase as the Company's stock price increases and decrease as the Company's stock price decreases. In contrast, the value of the swap agreement moves in the opposite direction of these liabilities, allowing the Company to fix a portion of the liabilities at a stated amount. As of December 31, 2018, the Company had hedged its deferred compensation liability related to approximately 250,000 common share equivalents. The fair value of the equity swap agreement is recorded in "Prepayments and other current assets" in the consolidated balance sheets. The fair value of the Company's equity swap agreement was a net asset position of $4 million at December 31, 2018 and $4 million at December 31, 2017.

Hedging Instruments
Cash Flow Hedges—Commodity Price Risk — The Company’s production processes are dependent upon the supply of certain raw materials that are exposed to price fluctuations on the open market. The primary purpose of the Company’s

commodity price forward contract activity is to manage the volatility associated with forecasted purchases for up to eighteen months in the future. The Company monitors its commodity price risk exposures regularly to maximize the overall effectiveness of its commodity forward contracts. Principal raw materials hedged include copper, nickel, tin, zinc, and aluminum. In certain instances within this program, foreign currency forwards may be used in order to match critical terms for commodity exposure.

The Company has designated these contracts as cash flow hedging instruments. The Company records unrecognized gains and losses in other comprehensive income (loss) ("OCI or OCL") and makes regular reclassifying adjustments into "Cost of sales" within the consolidated statements of income when the underlying hedged transaction is recognized in earnings. The Company had commodity derivatives outstanding with an equivalent notional amount of $27 million as of December 31, 2018 and none as of December 31, 2017. Substantially all of the commodity price hedge contracts mature within one year.

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Net Investment Hedge – Foreign Currency Borrowings — The Company has foreign currency denominated debt, €752 million of which was designated as a net investment hedge in certain foreign subsidiaries and affiliates of the Company. Changes to its carrying value are included in shareholders' equity in the foreign currency translation component of OCL and offset against the translation adjustment on the underlying net assets of those foreign subsidiaries and affiliates, which are also recorded in OCL. The Company's debt instruments are discussed further in Note 11—Debt and Other Financing Arrangements.

The following table is a summary of the carrying value of derivative and non-derivative instruments designated as hedges as of December 31, 2018:

	Balance sheets classification	Carrying Value December 31 2018 (Millions)
Commodity price hedge contracts designated as cash flow hedges	Accrued expenses and other current liabilities	$(2)
Foreign currency borrowings designated as net investment hedges	Long-term debt	$863

The following table represents the effects before reclassification into net income of derivative and non-derivative instruments designated as hedges in accumulated other comprehensive loss as of December 31, 2018:

	Amount of gain (loss) recognized in accumulated OCI or OCL (effective portion) December 31 2018 (Millions)
Foreign currency borrowings designated as net investment hedges	$(3)

The Company estimates less than $1 million of net derivative losses included in AOCI as of December 31, 2018 will be reclassified into earnings within the following 12 months. See Note 18—Changes in Accumulated Other Comprehensive Income (Loss) by Component for amounts recognized in OCL and amounts reclassified out of OCL for the year ended December 31, 2018 for these hedging instruments.

10. Fair Value of Financial Instruments

A three-level valuation hierarchy, based upon observable and unobservable inputs, is used for fair value measurements. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect market assumptions based on the best evidence available. A financial instrument’s categorization within the hierarchy is based on the lowest level of input that is significant to the fair value measurement. The fair value hierarchy definition prioritizes the inputs used in measuring fair value into the following levels:
Level 1 — Quoted prices in active markets for identical assets or liabilities.

Level 2 — Inputs, other than quoted prices in active markets, that are observable either directly or indirectly.

Level 3 — Unobservable inputs based on the Company's own assumptions.

Assets and Liabilities Measured at Fair Value on a Recurring Basis

The following table presents assets and liabilities included in the Company's consolidated balance sheets as of December 31, 2018 and 2017 that are recognized at fair value on a recurring basis, and indicate the fair value hierarchy utilized to determine such fair value:

		December 31, 2018		December 31, 2017	
	Fair value hierarchy	Carrying Amount	Fair Value	Carrying Amount	Fair Value
		(Millions)			
Derivative instruments:					
Equity swap agreement	Level 2	$4	$ 4	$ 4	$ 4
Commodity contracts	Level 2	$(2)	$ (2)	$ —	$ —

Asset and Liability Instruments — The carrying value of cash and cash equivalents, restricted cash, short and long-term receivables, accounts payable, and short-term debt approximates fair value.

Cash-settled Share Swap Transactions — The fair value of the equity swap agreement is recorded in "Prepayments and other current assets" in the consolidated balance sheets. The fair value of the Company's equity swap agreement was a net asset position of $4 million at December 31, 2018 and 2017.

Commodity contracts — The Company calculates the fair value of its commodity contracts and foreign currency contracts using quoted commodity forward rates and quoted currency forward rates, to calculate forward values, and then discounts the forward values. The discount rates for all derivative contracts are based on quoted bank deposit rates.

Assets and Liabilities Measured at Fair Value on a Nonrecurring Basis

In addition to items measured at fair value on a recurring basis, assets may be measured at fair value on a nonrecurring basis. These assets include long-lived assets and intangible assets which may be written down to fair value as a result of impairment.

The Company has determined the fair value measurements related to each of these rely primarily on Company-specific inputs and the Company's assumptions about the use of the assets, as observable inputs are not available (level 3). To determine the fair value of long-lived asset groups, the Company utilizes discounted cash flows expected to be generated by the long-lived asset group.

The Company evaluates the carrying value of its goodwill and indefinite-lived intangible assets for impairment annually in the fourth quarter of each year. These fair value measurements require the Company to make significant assumptions and estimates about the extent and timing of future cash flows, discount rates, and growth rates, which are subject to a high degree of uncertainty. The Company believes the assumptions and estimates used to determine the estimated fair value are reasonable, but different assumptions could materially affect the estimated fair value.

During the year ended December 31, 2018, the Company recorded a $3 million impairment charge for one of its reporting units. See Note 7, Goodwill and Other Intangible Assets.

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Financial Instruments Not Carried at Fair Value

Estimated fair values of the Company's outstanding debt were:

		December 31, 2018		December 31, 2017	
	Fair value hierarchy	Carrying Amount	Fair Value	Carrying Amount	Fair Value
Long-term debt (including current maturities):		(Millions)			
Term loans and senior notes	Level 2	$5,307	$5,218	$1,346	$1,383

The fair value of the Company's public senior notes and private borrowings under its senior credit facility is based on observable inputs. The Company also had $106 million and $15 million in other debt whose carrying value approximates fair value, which consists primarily of foreign debt with maturities of one year or less.

11. Debt and Other Financing Arrangements

Long-Term Debt

A summary of the Company's long-term debt obligations at December 31, 2018 and 2017, is set forth in the following table:

	2018			2017		
	Principal	Carrying Amount[1]	Effective Interest Rate	Principal	Carrying Amount[1]	Effective Interest Rate
	(Millions)					
Credit Facilities						
Revolver Borrowings						
Due 2023	$—	$ —	—	$244	$ 244	
Term Loans						
LIBOR plus 1.75% Term Loan A due 2019 through 2023[2]	1,700	1,691	6.160 %	—	—	—
LIBOR plus 2.75% Term Loan B due 2019 through 2025[3]	1,700	1,629	8.880 %	—	—	—
Senior Tranche A Term Loan	—	—	—	390	388	2.900 %
Senior Unsecured Notes						
$225 million of 5.375% Senior Notes due 2024[4]	225	222	5.609 %	225	222	5.609 %
$500 million of 5.000% Senior Notes due 2026[5]	500	493	5.219 %	500	492	5.219 %
Senior Secured Notes [9]						
€415 million 4.875% Euro Fixed Rate Notes due 2022[6]	476	496	3.599 %	—	—	—
€300 million of Euribor plus 4.875% Euro Floating Rate Notes due 2024[7]	343	349	4.620 %	—	—	—
€350 million of 5.000% Euro Fixed Rate Notes due 2024[8]	401	427	3.823 %	—	—	—
Other Debt, primarily foreign instruments	108	106		17	15	
		5,413			1,361	
Less — maturities classified as current		73			3	
Total long-term debt		$ 5,340			$ 1,358	

(1) Carrying amount is net of unamortized debt issuance costs and debt discounts or premiums. Total unamortized debt issuance costs were $90 million and $13 million as of December 31, 2018 and 2017. Total unamortized debt (premium) discount, net was $(49) million and $2 million as of December 31, 2018 and 2017.

(2) Principal and interest payable in 19 consecutive quarterly installments beginning March 31, 2019, with $21 million being paid quarterly in the seven quarters, followed by $32 million paid in the subsequent four quarters followed by

$43 million in the subsequent eight quarters and the remainder at maturity.
(3) Principal and interest payable in 27 consecutive quarterly installments beginning March 31, 2019 with $4 million paid quarterly and the remainder at maturity.
(4) Interest payable semiannually beginning on June 30, 2015 with principal due at maturity.
(5) Interest payable semiannually beginning on January 31, 2017 with principal due at maturity.
(6) Interest is payable quarterly on April 15 and October 15 of each year with principal due at maturity.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

(7) Interest accrues at the three-month EURIBOR rate (with 0% floor) plus 4.875% per annum and payable quarterly on January 15, April 15, July 15 and October 15.
(8) Interest payable semiannually on January 15 and July 15 of each year beginning on July 17, 2017 with principal due at maturity.
(9) Rank equally in right of payment to all indebtedness under the New Credit Facility (as subsequently defined).

The Company has excluded the required payments, within the next twelve months, under the Term Loan A and Term Loan B facilities totaling $85 million and $17 million, respectively, from current liabilities as of December 31, 2018, because the Company has the intent and ability to refinance the obligations on a long-term basis by using its revolving credit facility.

The aggregate maturities applicable to the long-term debt outstanding at December 31, 2018:

	Aggregate Maturities (Millions)
2019	$ 175
2020	$ 114
2021	$ 154
2022	$ 692
2023	$ 1,249

Interest expense associated with the amortization of the debt issuance costs and original issue discounts recognized in the Company's consolidated statements of income consists of the following:

	2018	2017	2016
	(Millions)		
Amortization of debt issuance fees	$ 8	$ 4	$ 4

Included in the table above, is the amortization of debt issuance costs on the revolver. These are $9 million at December 31, 2018 and are recorded in "Prepayments and other current assets." As a result of the Acquisition, the Senior Secured Notes listed in the table were acquired at fair value, which resulted in recognizing a debt premium of $54 million on these notes, of which $3 million was recognized as interest income during the year ended December 31, 2018.

Short-Term Debt
The Company's short-term debt as of December 31, 2018 and 2017 is as follows:

	At December 31	
	2018	2017
	(Millions)	
Maturities classified as current	$ 73	$ 3
Short-term borrowings[(a)]	66	80
Bank overdrafts	14	20
Total short-term debt	$ 153	$ 103
Weighted average interest rate on outstanding short-term borrowings at end of year	4.4 %	2.9 %

(a) Includes borrowings under both committed credit facilities and uncommitted lines of credit and similar arrangements.

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Credit Facilities

Financing Arrangements

	Committed Credit Facilities[a] as of December 31, 2018				
	Term	Commitments	Borrowings	Letters of Credit[b]	Available
	(Millions)				
Tenneco Inc. revolving credit agreement	2023	$ 1,500	$ —	$ 24	$ 1,476
Tenneco Inc. Term Loan A	2023	1,700	1,700	—	—
Tenneco Inc. Term Loan B	2025	1,700	1,700	—	—
Subsidiaries' credit agreements	2018-2028	154	51	3	100
		$ 5,054	$ 3,451	$ 27	$ 1,576

(a) The Company generally is required to pay commitment fees on the unused portion of the total commitment.
(b) Letters of credit reduce the available borrowings under the revolving credit agreement.

On October 1, 2018, the Company entered into a new credit agreement with JPMorgan Chase Bank, N.A., as administrative agent and other lenders (the " New Credit Facility") in connection with the acquisition of Federal-Mogul. The New Credit Facility consists of $4.9 billion of total debt financing, consisting of a five-year $1.5 billion revolving credit facility, a five-year $1.7 billion term loan A facility ("Term Loan A") and a seven-year $1.7 billion term loan B facility ("Term Loan B"). Proceeds from the New Credit Facility were used to finance the cash consideration portion of the Acquisition purchase price, to refinance the Company's then existing senior credit facilities inclusive of the revolver and the tranche A term loan then outstanding (the "Old Credit Facility"), certain senior credit facilities of Federal-Mogul, and to pay fees and expenses relating to the Acquisition and the financing thereof. The remainder, including future borrowings under the revolving credit facility, will be used for general corporate purposes.

The Company and Tenneco Automotive Operating Company Inc., a wholly-owned subsidiary, are borrowers under the New Credit Facility, and the Company is the sole borrower under the Term Loan A and Term Loan B facilities. The New Credit Facility is guaranteed on a senior basis by certain material domestic subsidiaries of the Company. Drawings under the revolving credit facility may be in U.S. dollars, British pounds or euros.

The New Credit Facility is secured by substantially all domestic assets of the Company, the subsidiary guarantors, and by pledges of up to 66% of the stock of certain first-tier foreign subsidiaries. The security for the New Credit Facility is pari passu with the security for the outstanding senior secured notes of Federal-Mogul that were assumed by the Company in connection with the Acquisition. If any foreign subsidiary of the Company is added to the revolving credit facility as a borrower, the obligations of such foreign borrower will be secured by the assets of such foreign borrower, and also will be secured by the assets of, and guaranteed by, the domestic borrowers and domestic guarantors as well as certain foreign subsidiaries of the Company in the chain of ownership of such foreign borrower.

As a result of the refinancing of the revolving credit agreement and tranche A term loan under the Old Credit Facility, the Company recorded a loss on extinguishment of debt of $10 million for the year-ended December 31, 2018, primarily consisting of debt issuance costs incurred at the transaction date and write-off of deferred debt issuance costs related to the refinanced revolving credit loan and tranche A term loan. The Company also recorded $1 million of loss on extinguishment of debt for the year ended December 31, 2017 related to amendment and restatement of the Old Credit Facility and the write-off of deferred debt issuance costs related to the Old Credit Facility. The Company recorded a $24 million loss on extinguishment of debt for the year ended December 31, 2016 for the repurchase and redemption of senior notes due 2020 and the write-off of debt issuance costs relating to those notes.

New Credit Facility — Interest Rates and Fees

The interest rate on borrowings under the revolving credit facility and the Term Loan A facility will initially be LIBOR plus 1.75%, which interest rate will be subject to change if the Company's consolidated net leverage ratio changes. Initially, and so long as the Company's corporate family rating is Ba3 (with a stable outlook) or higher from Moody's Investors Service, Inc. ("Moody's") and BB- (with a stable outlook) or higher from Standard & Poor's Financial Services LLC ("S&P"), the interest rate on borrowings under the Term Loan B facility will be LIBOR plus 2.75%; at any time the foregoing conditions are not satisfied, the interest rate on the Term Loan B facility will be LIBOR plus 3.00%. When the Term Loan B facility is no longer outstanding and the Company and its subsidiaries have no other secured indebtedness (with certain exceptions set forth in the New Credit Facility), and upon the Company achieving and maintaining two or more corporate credit and/or corporate family ratings higher than or equal to BBB- from S&P, BBB- from Fitch Ratings Inc. ("Fitch") and/or Baa3 from Moody's (in each case, with a stable or positive outlook), the collateral under the New Credit Facility may be released.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

New Credit Facility — Other Terms and Conditions
The New Credit Facility contains representations and warranties, and covenants which are customary for debt facilities of this type. The covenants limit the ability of the Company and its restricted subsidiaries to, among other things, to (i) incur additional indebtedness or issue preferred stock, (ii) pay dividends or make distributions to the Company's stockholders, (iii) purchase or redeem the Company's equity interests, (iv) make investments, (v) create liens on their assets, (vi) enter into transactions with the Company's affiliates, (vii) sell assets and (viii) merge or consolidate with, or dispose of substantially all of the Company's assets to, other companies.

The New Credit Facility includes customary events of default and other provisions that could require all amounts due thereunder to become immediately due and payable, either automatically or at the option of the lenders, if the Company fails to comply with the terms of the New Credit Facility or if other customary events occur.

The New Credit Facility also contains two financial maintenance covenants for the revolving credit facility and the Term Loan A facility including a requirement to have a consolidated net leverage ratio (as defined in the New Credit Facility) as of the end of each fiscal quarter of not greater than 4.0 to 1 through September 30, 2019, 3.75 to 1 through September 30, 2020 and 3.5 to 1 thereafter; and a requirement to maintain a consolidated interest coverage ratio (as defined in the New Credit Facility) for any period of four consecutive fiscal quarters of not less than 2.75 to 1.

The covenants in the New Credit Facility generally prohibit the Company from repaying or refinancing its senior unsecured notes. So long as no default exists, the Company would, under its New Credit Facility, be permitted to repay or refinance our senior unsecured notes (i) with the net cash proceeds of permitted refinancing indebtedness (as defined in the New Credit Facility); (ii) in an amount equal to the net cash proceeds of qualified capital stock (as defined in the New Credit Facility) issued after October 1, 2018 and (iii) in exchange for qualified capital stock issued after October 1, 2018; and (iv) with additional payments provided that such additional payments are capped as follows based on a pro forma consolidated leverage ratio after giving effect to such additional payments.

As of December 31, 2018, the Company was in compliance with all the financial covenants of the New Credit Facility.

Senior Notes
Senior Unsecured Notes
The Company has outstanding 5.375% senior unsecured notes due December 15, 2024 ("2024 Senior Notes") and 5.000% senior unsecured notes due July 15, 2026 ("2026 Senior Notes" and together with the 2024 Senior Notes, the "Senior Unsecured Notes") at December 31, 2018. The Company is permitted to redeem some or all of the outstanding Senior Unsecured Notes, at specified redemption prices that decline to par over a specified period, at any time (a) on or after December 15, 2019, in the case of the 2024 Senior Notes and (b) on or after July 15, 2021, in the case of the 2026 Senior Notes. In addition, the Senior Unsecured Notes may also be redeemed at a price generally equal to 100% of the principal amount thereof plus a premium based on the present values of the remaining payments due to the note holders. Further, the Company may redeem up to 35% of each Senior Unsecured Notes with the proceeds of certain equity offerings on or before July 15, 2019 at a redemption price equal to 105%, in the case of the 2026 Senior Notes.

If the Company experiences specified kinds of changes in control, the Company must offer to repurchase the Senior Unsecured Notes at 101% of the principal amount thereof plus accrued and unpaid interest. In addition, if the Company sells certain of its assets and does not apply the proceeds from the sale in a certain manner within 365 days of the sale, the Company must offer to repurchase the 2024 Senior Notes at 100% of the principal amount thereof plus accrued and unpaid interest.

Senior Secured Notes
In connection with the Acquisition of Federal-Mogul on October 1, 2018, the Company assumed an aggregate principal amount of €350 million ($401 million) 5.000% euro denominated fixed rate notes which are due July 15, 2024 ("5.000% Euro Fixed Rate Notes"), €415 million ($476 million) 4.875% euro denominated fixed rate notes due April 15, 2022 ("4.875% Euro Fixed Rate Notes"), and an aggregate principal amount of €300 million ($344 million) floating rate notes due April 15, 2024 ("Euro Floating Rate Notes" and together with the 5.000% Euro Fixed Rate Notes and the 4.875% Euro Fixed Rate Notes, the “Senior Secured Notes”).

The Company is permitted to redeem some or all of the outstanding Senior Secured Notes at specified redemption prices that decline to par over a specified period, at any time (a) on or after July 15, 2020, in the case of the 5.000% Euro Fixed Rate Notes, (b) on or after April 15, 2019, in the case of the 4.875% Euro Fixed Rate Notes and (c) on or after April 15, 2018, in the case of the Euro Floating Rate Notes. In addition, the Senior Secured Notes may also be redeemed at a price generally equal to 100% of the principal amount thereof plus a premium based on the present values of the remaining payments due to the note

holders. Further, the Company may also redeem up to 40% of the 5.000% Euro Fixed Rate Notes and the 4.875% Euro Fixed Rate Notes with the proceeds of certain equity offerings at any time prior to (a) July 15, 2020 at a redemption price of 105.0% in the case of the 5.000% Euro Fixed Rate Notes, and (b) April 15, 2019 at a redemption price of 104.875% in the case of the 4.875% Euro Fixed Rate Notes.

If the Company experiences specified kinds of changes in control, the Company must offer to repurchase the Senior Secured Notes at 101% of the principal amount thereof plus accrued and unpaid interest. In addition, if the Company sells certain of its assets and does not apply the proceeds from the sale in a certain manner within 365 days of the sale, the Company must offer to repurchase the Senior Secured Notes at 100% of the principal amount thereof plus accrued and unpaid interest.

The Company has designated a portion of the Senior Secured Notes as a net investment hedge of its European operations. As such, the fluctuations in foreign currency exchange rates on the value of the Senior Secured Notes is recorded to cumulative translation adjustment. See Note 9, Derivatives and Hedging Activities for further details.

Senior Unsecured Notes and Senior Secured Notes - Other Terms and Conditions
The Senior Unsecured Notes and Senior Secured Notes contain covenants that will, among other things, limit the Company's ability to create liens and enter into sale and leaseback transactions. In addition, the Senior Secured Notes and 2024 Unsecured Senior Notes also require that, as a condition precedent to incurring certain types of indebtedness not otherwise permitted, our consolidated fixed charge coverage ratio, as calculated on a pro forma basis, be greater than 2.00, as well as containing restrictions on its operations, including limitations on: (i) incurring additional indebtedness; (ii) paying dividends; (iii) distributions and stock repurchases; (iv) investments; (v) asset sales and (vi) mergers and consolidations.

Subject to limited exceptions, all of the Company's existing and future material domestic wholly owned subsidiaries fully and unconditionally guarantee its Senior Unsecured Notes and Senior Secured Notes on a joint and several basis. There are no significant restrictions on the ability of the subsidiaries that have guaranteed the Company's Senior Notes to make distributions to the Company.

Other Debt
Other debt consists primarily of foreign debt with maturities of one year or less.

Accounts Receivable Securitization and Factoring
On-Balance Sheet Arrangements
The Company has securitization programs for some of its accounts receivable, with limited recourse provisions. Borrowings on these securitization programs are recorded in short-term debt.

Borrowings on these securitization programs at December 31, 2018 and 2017 are as follows:

	As of December 31	
	2018	2017
	(Millions)	
Borrowings on securitization programs	$ 6	$ 30

The Company had an accounts receivable securitization program in which original equipment and aftermarket receivables were securitized on a daily basis. The Company was responsible for performing all accounts receivable

administration functions for these securitized financial assets including collections and processing of customer invoice adjustments. In October 2018, this program was terminated. As of December 31, 2017, the carrying amount of assets pledged as collateral for this securitization program was $343 million.

Off-Balance Sheet Arrangements

In the Company's European and U.S. accounts receivable factoring programs, accounts receivables are transferred in their entirety to the acquiring entities and are accounted for as a sale. Due to the Acquisition, additional factoring arrangements in the U.S. and Europe were acquired which are also accounted for as a sale and have been included in the tables below. The fair value of assets received as proceeds in exchange for the transfer of accounts receivable under these factoring programs approximates the fair value of such receivables. Certain programs in Europe have deferred purchase price arrangements with the banks.

The Company is the servicer of the receivables under some of these arrangements and is responsible for performing all accounts receivable administration functions. Where the Company receives a fee to service and monitor these transferred

accounts receivables, such fees are sufficient to offset the costs and as such, a servicing asset or liability is not recorded as a result of such activities.

In the U.S and Canada, the Company participates in supply chain financing programs with certain of the Company's aftermarket customers through a drafting program.

The amounts outstanding for these factoring and drafting arrangements as of December 31, 2018 and 2017 are as follows:

	As of December 31	
	2018	2017
	(Millions)	
Accounts receivable outstanding and derecognized	$1,011	$406
Deferred purchase price receivable	$154	$114

Proceeds from the factoring of accounts receivable qualifying as sales and drafting programs, and expenses associated with these arrangements for the years ended December 31, 2018, 2017, and 2016 are as follows:

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Proceeds from factoring qualifying as sales	$3,390	$1,984	$1,770
Loss on sale of receivables	$16	$5	$5

If the Company were not able to factor receivables or sell drafts under either of these programs, its borrowings under its revolving credit agreement might increase. These programs provide the Company with access to cash at costs that are generally favorable to alternative sources of financing and allow the Company to reduce borrowings under its revolving credit agreement.

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12. Accrued Expenses and Other Current Liabilities

Accrued expenses and other current liabilities at December 31, 2018 and 2017 included the following:

	December 31	
	2018	2017
	(Millions)	
Accrued rebates	$189	$68
Product return reserves	95	16
Restructuring liabilities	91	16
Legal reserves	71	88
Non-income tax payable	67	52
Pension and postretirement benefits liability	50	14
Accrued freight	48	26
Liabilities held for sale	39	—
Accrued warranty	39	23
Accrued interest	33	14
Accrued professional services	31	8
Environmental reserve	12	2
Other	236	97
	$1,001	$424

13. Pension Plans, Postretirement and Other Employee Benefits

Defined Contribution Plans
Effective January 1, 2012, the Tenneco Employee Stock Ownership Plan for Hourly Employees and the Tenneco Employee Stock Ownership Plan for Salaried Employees were merged into one plan called the Tenneco 401(k) Retirement Savings Plan (the "Retirement Savings Plan"). The Retirement Savings Plan allows for an enhanced company match and contributions for all eligible salaried and hourly employees. As a result of the Acquisition, the Company acquired Federal-Mogul's 401(k) Retirement Savings Plan. The Company recorded expense for contributions to its plans of approximately $43 million, $29 million and $28 million in 2018, 2017 and 2016, respectively.

Defined Benefit Plans
The Company sponsors defined benefit pension plans, and health care and life insurance benefits for certain employees and retirees around the world. There is also an unfunded nonqualified pension plan primarily covering U.S. executives.
The funding policy for defined benefit pension plans is to contribute the minimum required by applicable laws and regulations or to directly pay benefit payments where appropriate. At December 31, 2018, all legal funding requirements had been met. The Company expects to contribute $26 million to its U.S. pension plans, $42 million to its non-U.S. pension plans, and $28 million to its other postretirement plans in 2019.

Other Benefits
The Company also provides benefits to former or inactive employees paid after employment but before retirement. The liabilities for such U.S. and European postemployment benefits were $75 million and $9 million as of December 31, 2018 and 2017.

Significant Events

As a result of the Acquisition, the Company assumed $848 million in underfunded defined benefit pension and other postretirement benefit obligations.

In December 2018, the Company approved an amendment for one of its U.S. postretirement medical benefit plans. Beginning June 1, 2019, eligible retirees that opt to receive benefits will receive a fixed subsidiary payment to purchase health care benefits on a marketplace exchange in lieu of the original plan’s medical benefits. The amendments to the plan resulted in a plan remeasurement and recognition of a negative plan amendment, which reduced the Company's obligation by $66 million with a corresponding increase of $51 million in AOCI (net of taxes of $16 million) as of December 31, 2018. The $66 million is being amortized on a straight-line basis as a reduction to net periodic postretirement benefit cost over participants' average remaining service periods.

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In February 2016, the Company launched a voluntary program to buy out active employees and retirees who had earned benefits in the U.S. pension plans. As of December 31, 2016, this program had been substantially completed with cash payments to those who elected to take the buyout made from pension plan assets in the fourth quarter of 2016. In connection with this program the Company contributed $18 million into the pension trust and recognized a non-cash charge of $72 million. The program was completed in the first quarter of 2017, at which time we contributed another $10 million and recognize a non-cash charge of $6 million during the year ended December 31, 2017.

The measurement date for all defined benefit plans is December 31. The following provides a reconciliation of the plans' benefit obligations, plan assets, and funded status as of December 31, 2018 and 2017:

	Pension Plans				Other Postretirement Benefits Plans	
	U.S.		Non-U.S.			
	2018	2017	2018	2017	2018	2017
	(Millions)					
Change in benefit obligation:						
Benefit obligation, beginning of year	$263	$272	$471	$438	$151	$143
Federal-Mogul acquisition	1,064	—	545	—	263	—
Service cost	1	1	13	9	—	—
Interest cost	21	10	15	13	8	5
Settlement	(1)	(7)	(13)	(3)	—	—
Curtailment	—	—	—	—	(1)	—
Administrative expenses/taxes paid	—	—	(3)	(2)	—	—
Plan amendments	—	—	2	—	(66)	—
Actuarial (gain)/loss	(12)	10	(16)	(9)	(24)	12
Benefits paid	(34)	(23)	(22)	(18)	(15)	(10)
Medicare subsidies received	—	—	—	—	1	—
Participants' contributions	—	—	1	1	1	—
Held for sale	—	—	(16)	—	—	—
Currency rate conversion and other	—	—	(31)	42	4	1
Benefit obligation, end of year	1,302	263	946	471	322	151
Change in plan assets:						
Fair value of plan assets, beginning of year	202	192	438	369	—	—
Federal-Mogul acquisition	943	—	81	—	—	—
Settlement	(1)	(7)	(14)	(3)	—	—
Actual return on plan assets	(122)	22	(1)	42	—	—
Administrative expenses/taxes paid	—	—	—	(2)	—	—
Employer contributions	6	18	21	14	13	10
Medicare subsidies received	—	—	—	—	1	—
Participants' contributions	—	—	1	1	1	—
Benefits paid	(33)	(23)	(25)	(18)	(15)	(10)
Held for sale	—	—	(10)	—	—	—
Currency rate conversion and other	—	—	(25)	35	—	—
Fair value of plan assets, end of year	995	202	466	438	—	—
Funded status of the plans	$(307)	$(61)	$(480)	$(33)	$(322)	$(151)

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Amounts recognized on the consolidated balance sheets consist of the following as of December 31, 2018 and 2017:

	Pension Plans				Other Postretirement Benefits Plans	
	U.S.		Non-U.S.			
	2018	2017	2018	2017	2018	2017
	(Millions)					
Noncurrent assets	$—	$—	$33	$28	$—	$—
Current liabilities	(5)	(2)	(17)	(3)	(28)	(9)
Noncurrent liabilities [a]	(302)	(59)	(496)	(58)	(294)	(142)
	$(307)	$(61)	$(480)	$(33)	$(322)	$(151)

[a] The "pension and postretirement benefits" line in the consolidated balance sheets includes $75 million and $9 million as of December 31, 2018 and 2017 of postemployment benefits which are not included in the table above.

Amounts recognized in accumulated other comprehensive loss for pension and postretirement benefits, inclusive of tax effects, consist of the following components as of December 31, 2018 and 2017:

	Pension Plans				Other Postretirement Benefits Plans	
	U.S.		Non-U.S.			
	2018	2017	2018	2017	2018	2017
	(Millions)					
Actuarial loss	$255	$130	$80	$91	$31	$51
Prior service cost/(credit)	—	—	4	3	(73)	—
Total	$255	$130	$84	$94	$(42)	$51

Information for defined benefit plans with projected benefit obligations in excess of plan assets:

	Pension Plans				Other Postretirement Benefits Plans	
	2018		2017			
	U.S.	Non-U.S.	U.S.	Non-U.S.	2018	2017
	(Millions)					
Projected benefit obligation	$1,302	$652	$263	$130	$322	$151
Fair value of plan assets	$995	$138	$202	$69	$—	$—

Information for pension plans with accumulated benefit obligations in excess of plan assets:

	December 31, 2018		December 31, 2017	
	U.S.	Non-U.S.	U.S.	Non-U.S.
	(Millions)			
Projected benefit obligation	$1,302	$620	$263	$117
Accumulated benefit obligation	$1,302	$606	$263	$112
Fair value of plan assets	$995	$111	$202	$56

The accumulated benefit obligation for all pension plans is $2,225 million and $728 million as of December 31, 2018 and 2017.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Net periodic pension and postretirement benefits costs for the years 2018, 2017 and 2016, consist of the following components:

	Pension Plans						Other Postretirement Benefits Plans		
	U.S.			Non-U.S.					
	2018	2017	2016	2018	2017	2016	2018	2017	2016
	(Millions)								
Service cost	$1	$1	$1	$14	$9	$8	$—	$—	$—
Interest cost	21	10	15	15	13	14	8	5	6
Expected return on plan assets	(28)	(14)	(23)	(18)	(25)	(20)	—	—	—
Curtailment loss	—	—	—	—	—	—	1	—	—
Settlement loss	1	8	72	3	1	—	—	—	—
Net amortization:									
Actuarial loss	5	5	8	6	9	7	5	4	5
Prior service cost (credit)	—	—	—	1	1	1	—	(1)	(1)
Net periodic costs	$—	$10	$73	$21	$8	$10	$14	$8	$10

The following assumptions were used in the accounting for the pension and other postretirement benefits plans for the years of 2018, 2017, and 2016:

	Pension Plans						Other Postretirement Benefits Plans		
	U.S.			Non-U.S.					
	2018	2017	2016	2018	2017	2016	2018	2017	2016
Weighted-average assumptions used to determine benefit obligations:									
Discount rate	4.2%	3.8%	4.2%	2.6%	2.6%	2.8%	4.3%	3.8%	4.2%
Rate of compensation increase	n/a	n/a	n/a	— %	2.5%	2.5%	n/a	n/a	n/a
Weighted-average assumptions used to determine net periodic benefit cost:									
Discount rate	4.1%	4.2%	4.3%	2.4%	2.8%	3.5%	4.2%	4.2%	4.3%
Expected long-term return on plan assets	6.0%	7.8%	7.6%	4.2%	5.2%	5.7%	n/a	n/a	n/a
Rate of compensation increase	n/a	n/a	n/a	2.9%	2.5%	2.7%	n/a	n/a	n/a

Estimated amounts to be amortized from accumulated other comprehensive loss into net periodic benefit cost in the year ending December 31, 2019 based on December 31, 2018 plan measurements:

	2019 Pension Plans		Other Postretirement Benefits Plans
	U.S	Non-U.S	
	(Millions)		
Net actuarial loss	$5	$ 5	$ 4
Prior service cost	—	1	(8)
	$5	$ 6	$ (4)

Estimated future benefit payments are as follows:

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Year	Pension Plans U.S.	Pension Plans Non-U.S.	Other Postretirement Benefits Plans
	(Millions)		
2019	$100	$ 43	$ 28
2020	$99	$ 44	$ 28
2021	$99	$ 43	$ 27
2022	$101	$ 45	$ 26
2023	$100	$ 49	$ 26
2024-2028	$442	$ 243	$ 113

Health Care Trend

The weighted-average assumed health care cost trend rate used in determining next year's postretirement health care benefits are as follows:

	Other Postretirement Benefits Plans		
	2018	2017	2016
Initial health care cost trend rate	6.9 %	6.8 %	7.0 %
Ultimate health care cost trend rate	4.9 %	4.5 %	4.5 %
Year ultimate health care cost trend rate reached	2027	2027	2026

The assumed health care cost trend rate has a significant effect on the amounts reported for other postretirement benefits plans. The following table illustrates the sensitivity to a change in the assumed health care cost trend rate:

	Total Service and Interest Cost	Postretirement Benefits Obligation
	(Millions)	
100 basis point ("bp") increase in health care cost trend rate	$1	$ 23
100 bp decrease in health care cost trend rate	$(1)	$ (20)

Long-term Rate of Return

The Company's expected return on assets is established annually through analysis of anticipated future long-term investment performance for the plan based upon the asset allocation strategy and is primarily a long-term prospective rate.

An analysis was performed in December 2018 resulting in changes to the expected long-term rate of return on assets. The weighted-average long-term rate of return on assets for the U.S. pension plans decreased from 7.75% at December 31, 2017 to 6.00% at December 31, 2018. The expected long-term rate of return on plan assets used in determining pension expense for non-U.S. plans is determined in a similar manner to the U.S. plans and decreased from 5.25% at December 31, 2017 to 4.2% at December 31, 2018.

Plan Assets

Certain pension plans sponsored by the Company invest in a diversified portfolio consisting of an array of asset classes that attempts to maximize returns while minimizing volatility. These asset classes include developed market equities, emerging market equities, private equity, global high quality and high yield fixed income, real estate, and absolute return strategies.

U.S. Plan

The U.S. investment strategy mitigates risk by incorporating diversification across appropriate asset classes to meet the plan's objectives. It is intended to reduce risk, provide long-term financial stability for the plan, and maintain funded levels that meet long-term plan obligations while preserving sufficient liquidity for near-term benefit payments. Risk assumed is considered appropriate for the return anticipated and consistent with the diversification of plan assets. Approximately 49% of the U.S. plan assets were invested in actively managed investment funds. The Company's investment strategy includes a target asset allocation of 60% equity investments, 15% fixed income investments, 15% debt securities, and 10% in other investment types including hedge funds.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Non-U.S. Plans

The Company's non-U.S. plans are individually managed to different target levels depending on the investing environment in each country and the funded status of each plan, with an increased allocation of assets to equity and fixed income securities at higher funded ratios. The insurance contracts guarantee a minimum rate of return. The Company has no input into the investment strategy of the assets underlying the contracts, but they are typically heavily invested in active bond markets and are highly regulated by local law.

Pension plan assets were invested in the following classes of securities:

	Percentage of Fair Market Value December 31, 2018	
	U.S.	Non-U.S.
Equity securities	62%	32 %
Fixed income securities	17%	5 %
Debt securities	11%	43 %
Insurance contracts	—%	15 %
Other	10%	5 %

The assets of some of the Company's pension plans are invested in trusts that permit commingling of the assets of more than one employee benefit plan for investment and administrative purposes. Each of the plans participating in the trust has interests in the net assets of the underlying investment pools.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

The following table presents the Company’s defined benefit plan assets measured at fair value by asset class:

Asset Category	Fair Value Level as of December 31, 2018							
	U.S.				Non-U.S.			
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
	(Millions)							
Investments with registered investment companies:								
Equity securities	$323	$ —	$ —	$323	$1	$ —	$ —	$1
Fixed income securities	167	—	—	167	21	—	—	21
Real estate and other	41	—	—	41	—	—	—	—
Equity securities	194	—	—	194	14	55	—	69
Debt securities:								
Corporate and other	—	18	—	18	8	—	—	8
Government	12	21	—	33	2	147	—	149
Real Estate and other	—	—	—	—	1	4	—	5
Insurance contracts	—	—	—	—	—	—	71	71
Hedge funds	—	—	28	28	—	—	—	—
Cash and equivalents	33	—	—	33	17	—	—	17
Total	$770	$ 39	$ 28	$837	$64	$ 206	$ 71	$341
Plan assets measured at net asset value								
Equity securities				$104				$81
Government debt securities				—				30
Corporate and other debt securities				54				14
Total plan assets measured at net asset value				158				125
Net plan assets				$995				$466

Asset Category	Fair Value Level as of December 31, 2017							
	U.S.				Non-U.S.			
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
	(Millions)							
Equity securities	$21	$ —	$ —	$21	$16	$ 101	$ —	$117
Debt securities:								
Corporate and other	—	—	—	—	6	16	—	22
Government	—	—	—	—	2	112	—	114
Real Estate and other	—	—	—	—	1	6	—	7
Insurance contracts	—	—	—	—	—	16	9	25
Cash and equivalents	2	—	—	2	9	1	—	10
Total	$23	$ —	$ —	$23	$34	$ 252	$ 9	$295
Plan assets measured at net asset value								
Equity securities				$120				$97
Government debt securities				—				32
Corporate and other debt securities				59				14
Total plan assets measured at net asset value				179				143
Net plan assets				$202				$438

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

The Company's level 1 assets were valued using market prices based on daily net asset value ("NAV") or prices available daily through a public stock exchange. Its level 2 assets were valued primarily using market prices, sometimes net of estimated realization expenses, and based on broker/dealer markets or in commingled funds where NAV is not available daily or publicly. For insurance contracts, the estimated surrender value of the policy was used to estimate fair market value.

The table below summarizes the changes in the fair value of the Level 3 assets:

	December 31, 2018		December 31, 2017	
	Level 3 Assets		Level 3 Assets	
	U.S.	Non-U.S.	U.S.	Non-U.S.
	(Millions)		(Millions)	
Balance at December 31 of the previous year	$—	$ 9	$ —	$ 9
Federal-Mogul acquisition	30	56	—	—
Net realized/unrealized gains (loss)	(2)	1	—	—
Purchases and settlements, net	—	—	—	—
Sales, net	—	—	—	—
Transfers into (out) of Level 3	—	15	—	—
Held for sale	—	(10)		
Foreign currency exchange rate movements	—	—	—	—
Ending Balance at December 31	$28	$ 71	$ —	$ 9

The following table contains information about significant concentrations of risk, including all individual assets that make up more than 5% of the total assets and any direct investments in Tenneco stock:

Asset Category	Fair Value Level	Value	Percentage of Total Assets
		(Millions)	
2018:			
Tenneco stock	1	$ 10	0.7 %
2017:			
Tenneco stock	1	$ 21	3.3 %

The Company's approach to determining expected return on plan asset assumptions evaluates both historical returns as well as estimates of future returns, and adjusts for any expected changes in the long-term outlook for the equity and fixed income markets for both its U.S. and Non-U.S. plans.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

14. Income Taxes

The domestic and foreign components of the Company's earnings before income taxes and noncontrolling interests are as follows:

	Year Ended December 31,		
	2018	2017	2016
	(Millions)		
U.S. income earnings (loss) before income taxes	$(138)	$(28)	$52
Foreign earnings (loss) before income taxes	312	364	359
Earnings (loss) before income taxes and noncontrolling interests	$174	$336	$411

Following is a comparative analysis of the components of income tax expense (benefit):

	Year Ended December 31,		
	2018	2017	2016
	(Millions)		
Current —			
U.S. federal	$ 8	$ (23)	$ (9)
State and local	1	1	4
Foreign	119	101	85
	128	79	80
Deferred —			
U.S. federal	(35)	16	(95)
State and local	(5)	(3)	(1)
Foreign	(25)	(21)	12
	(65)	(8)	(84)
Income tax expense (benefit)	$ 63	$ 71	$ (4)

Following is a reconciliation of income taxes computed at the statutory U.S. federal income tax rate (21% for 2018 and 35% for 2017 and 2016) to the income tax expense (benefit) reflected in the consolidated statements of income:

	Year Ended December 31,		
	2018	2017	2016
	(Millions)		
Income tax expense computed at the statutory U.S. federal income tax rate	$ 37	$ 117	$ 144
Increases (reductions) in income tax expense resulting from:			
Foreign income taxed at different rates	19	(48)	(42)
Transition Tax under Tax Cuts and Jobs Act ("TCJA")	11	43	—
Re-measurement of Worldwide Deferred Taxes	—	53	—
State and local taxes on income, net of U.S. federal income tax benefit	(6)	(2)	3
Changes in valuation allowance for tax loss carryforwards and credits	—	(1)	18
Investment and R&D tax credits	(12)	(6)	(6)
Foreign earnings subject to U.S. federal income tax	9	(74)	(101)
Tax contingencies	1	(1)	(7)
Other	4	(10)	(13)
Income tax expense (benefit)	$ 63	$ 71	$ (4)

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

The Company reported income tax expense of $63 million in 2018, $71 million in 2017 and a tax benefit of $4 million in 2016. The tax expense recorded in 2018 included tax benefits of $10 million relating to a valuation allowance release at its Australian entities and $11 million of tax expense for changes in the toll tax as discussed below. The tax expense recorded in 2017 includes a net provisional tax expense of $43 million for one-time transition tax on deemed repatriation of previously deferred foreign earnings under the Tax Cuts and Jobs Act ("TCJA") as discussed below. The Company remeasured U.S. deferred taxes from an applicable federal rate of 35% to the new statutory rate of 21% at which they are expected to be utilized, recording a $51 million provisional expense. The tax expense recorded in 2017 included a net tax benefit of $74 million relating to recognizing a U.S. tax benefit for foreign taxes. The tax expense recorded in 2016 included a net tax benefit of $110 million primarily relating to the recognition of a U.S. tax benefit for foreign taxes. In 2016, the Company completed its detailed analysis of its ability to recognize and utilize foreign tax credits within the carryforward period. As a result, the Company amended its U.S. federal tax returns for the years 2006 to 2012 to claim foreign tax credits in lieu of deducting foreign taxes paid. The U.S. foreign tax credit law provides for a credit against U.S. taxes otherwise payable for foreign taxes paid with regard to dividends, interest and royalties paid to the Company in the U.S. Income tax expense also decreased in 2016 as a result of the mix of earnings in the Company's various tax jurisdictions.

On December 22, 2017, the TCJA was enacted into U.S. law, which, among other provisions, lowered the corporate income tax rate effective January 1, 2018 from 35% to 21%, and implemented significant changes with respect to U.S. tax treatment of earnings originating from outside the U.S. Many of the provisions of TCJA are subject to regulatory interpretation and U.S. state conforming enactments. The Internal Revenue Service (IRS) issued Notice 2018-26 on April 2, 2018 and issued proposed regulations under Section 965 on August 1, 2018, which provided additional guidance to assist taxpayers in computing the toll tax. Based on the new guidance, an $11 million discrete charge was recorded in income tax expense in 2018. The Company has completed our accounting for the tax effects of the enactment as of December 31, 2018.

The Company elected to account for Global Intangible Low-Taxed Income (“GILTI”) as a current-period expense when incurred. Therefore, the Company has not recorded deferred taxes for basis differences expected to reverse in the future periods.

The components of the Company's net deferred tax assets were as follows:

	December 31,	
	2018	2017
	(Millions)	
Deferred tax assets —		
Tax loss carryforwards:		
State	$18	$19
Foreign	364	114
Tax credits	159	118
Postretirement benefits other than pensions	21	37
Pensions	158	24
Payroll accruals	24	18
Book over tax depreciation	68	(45)
Other accruals	163	80
Valuation allowance	(514)	(163)
Total deferred tax assets	461	202
Deferred tax liabilities —		

Amortization of intangibles	82	—
Total deferred tax liabilities	82	—
Net deferred tax assets	$379	$202

State tax loss carryforwards have been presented net of uncertain tax positions that, if realized, would reduce tax loss carryforwards in both 2018 and 2017 by $2 million. Additionally, foreign tax loss carryforwards, have been presented net of uncertain tax positions that, if realized, would reduce tax loss carryforwards in 2018 and 2017 by $68 million and $7 million, respectively.

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

	December 31,	
	2018	2017
	(Millions)	
Consolidated Balance Sheets:		
Non-current portion — deferred tax asset	$467	$213
Non-current portion — deferred tax liability	(88)	(11)
Net deferred tax assets	$379	$202

We evaluate our deferred income taxes quarterly to determine if valuation allowances are required or should be adjusted. This assessment considers, among other matters, the nature, frequency and amount of recent losses, the duration of statutory carryforward periods, and tax planning strategies. In making such judgments, significant weight is given to evidence that can be objectively verified. If recent operational improvements continue in our foreign subsidiaries or if certain restructuring steps are completed as part of the Federal-Mogul acquisition and future spin of the Ride Performance / Aftermarket company, we believe it is reasonably possible that sufficient positive evidence may be available to release all, or a portion, of its valuation allowance in the next twelve months. This may result in a one-time tax benefit of up to $51 million, primarily related to Spain, China, and Czech Republic.

As a result of the valuation allowances recorded of $514 million and $163 million at December 31, 2018 and 2017, respectively, the Company has potential tax assets that were not recognized on its consolidated balance sheets. These unrecognized tax assets resulted primarily from foreign tax loss carryforwards, foreign investment tax credits, foreign research and development credits and U.S. state net operating losses ("NOLs") that are available to reduce future tax liabilities.

The Company's state NOLs expire in various tax years through 2039. The Company's non-U.S. NOLs expire in various tax years through 2038, or have unlimited carryforward potential.

The Company does not provide for U.S. income taxes on unremitted earnings of foreign subsidiaries, except for the earnings of certain of its China operations and in certain of its joint ventures in Spain, South Korea, and India, as its present intention is to reinvest the unremitted earnings in its foreign operations. Unremitted earnings of foreign subsidiaries were approximately $2.6 billion at December 31, 2018. The Company estimated that the amount of U.S. and foreign income taxes that would be accrued or paid upon remittance of the assets that represent those unremitted earnings was $117 million.

A tax benefit from an uncertain tax position may be recognized when it is “more likely than not” that the position will be sustained upon examination, including resolutions of any related appeals or litigation processes, based on the technical merits.

A reconciliation of the Company's uncertain tax positions is as follows:

	2018	2017	2016
	(Millions)		
Uncertain tax positions —			
Balance January 1	$112	$111	$123
Gross increases in tax positions due to acquisition	110	—	—
Gross increases in tax positions in current period	8	6	6
Gross increases in tax positions in prior period	7	2	2
Gross decreases in tax positions in prior period	(1)	(2)	(5)
Gross decreases — settlements	(2)	—	—

Gross decreases — statute of limitations expired	(10)	(5)	(15)
Balance December 31	$224	$112	$111

Included in the balance of uncertain tax positions were $134 million in 2018, $108 million in 2017, $108 million in 2016, of tax benefits, that if recognized, would affect the effective tax rate. The Company recognizes accrued interest and penalties related to unrecognized tax benefits as income tax expense. Penalties of less than $1 million were accrued in 2018, 2017 and 2016. Additionally, the Company accrued interest expense related to uncertain tax positions of $2 million in 2018, and interest expense of less than $1 million in both 2017 and 2016. The Company's liability for penalties was $12 million at December 31, 2018, and $1 million at both December 31, 2017 and December 31, 2016, and its liability for interest was $11 million at December 31, 2018 and $4 million at both December 31, 2017 and December 31, 2016.

The Company's uncertain tax position at December 31, 2018 and 2017 included exposures relating to the disallowance of deductions, global transfer pricing and various other issues. The Company believes it is reasonably possible that a decrease of up to $14 million in unrecognized tax benefits related to the expiration of U.S. and foreign statute of limitations and the conclusion of income tax examinations may occur within the next twelve months.

The Company is subject to taxation in the U.S. and various state and foreign jurisdictions. As of December 31, 2018, the Company's tax years open to examination in primary jurisdictions are as follows:

	Open To Tax Year
United States	2003
Belgium	2016
Brazil	2014
China	2009
Germany	2009
Mexico	2013
Poland	2013
Spain	2000
United Kingdom	2015
Italy	2013
France	2009
India	1995

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

15. Commitments and Contingencies

Capital Commitments

The Company estimates expenditures aggregating to approximately $181 million will be required after December 31, 2018 to complete facilities and projects authorized at such date, and it has made substantial commitments in connection with these facilities and projects.

Lease Commitments

The Company's facilities and equipment are generally leased under arrangements that are accounted for as operating leases. Total rental expense for the years ended December 31, 2018, 2017 and 2016 was $111 million, $81 million and $74 million, respectively. Future minimum operating lease payments at December 31, 2018 are as follows:

	(Millions)
2019	$ 120
2020	100
2021	86
2022	68
2023	56
Beyond 2023	53
Total minimum lease payments	$ 483

Certain equipment is leased under long term agreements. Capital assets for these agreements were $2 million and $1 million at December 31, 2018 and 2017. The minimum lease payments under our non-cancellable capital leases with lease terms in excess of one year are less than $1 million in each of the next five years.

Environmental Matters

The Company is subject to a variety of environmental and pollution control laws and regulations in all jurisdictions in which it operates. The Company has been notified by the U.S. Environmental Protection Agency, other national environmental agencies, and various provincial and state agencies it may be a potentially responsible party (“PRP”) under such laws for the cost of remediating hazardous substances pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") and other national and state or provincial environmental laws. PRP designation typically requires the funding of site investigations and subsequent remedial activities. Many of the sites that are likely to be the costliest to remediate are often current or former commercial waste disposal facilities to which numerous companies sent wastes. Despite the potential joint and several liability which might be imposed on the Company under CERCLA and some of the other laws pertaining to these sites, its share of the total waste sent to these sites generally has been small. The Company believes its exposure for liability at these sites is limited.
On a global basis, the Company has also identified certain other present and former properties at which it may be responsible for cleaning up or addressing environmental contamination, in some cases as a result of contractual commitments and/or federal or state environmental laws. The Company is actively seeking to resolve these actual and potential statutory, regulatory, and contractual obligations.

The Company expenses or capitalizes, as appropriate, expenditures for ongoing compliance with environmental regulations. As of December 31, 2018, the Company has an obligation to remediate or contribute towards the remediation of certain sites, including the sites discussed above at which it may be a PRP. The Company's aggregated estimated share of environmental remediation costs for all these sites on a discounted basis was approximately $40 million as of December 31, 2018, of which $12 million is recorded in accrued expenses and other current liabilities and $28 million is recorded in deferred credits and other liabilities in the consolidated balance sheets. For those locations where the liability was discounted, the weighted average discount rate used was 2.9%. The undiscounted

value of the estimated remediation costs was $46 million as of December 31, 2018. The Company's expected payments of environmental remediation costs for non-indemnified locations are estimated to be approximately $10 million in 2019, $6 million in 2020, $3 million in both 2021 and 2022, $2 million in 2023 and $16 million in the aggregate thereafter.

In addition to amounts described above, the Company estimates it will make expenditures for property, plant and equipment for environmental matters of approximately $14 million in 2019 and $7 million in 2020.

Based on information known to the Company from site investigations and the professional judgment of consultants, the Company has established reserves it believes are adequate for these costs. Although the Company believes these estimates of remediation costs are reasonable and are based on the latest available information, the costs are estimates, difficult to quantify based on the complexity of the issues, and are subject to revision as more information becomes available about the extent of remediation required. At some sites, the Company expects other parties will contribute to the remediation costs. In addition, certain environmental statutes provide that the Company's liability could be joint and several, meaning that the Company could be required to pay amounts in excess of its share of remediation costs. The financial strength of the other PRPs at these sites has been considered, where appropriate, in the determination of the estimated liability. The Company does not believe any potential costs associated with its current status as a PRP, or as a liable party at the other locations referenced herein, will be material to its annual consolidated financial position, results of operations, or liquidity.

Antitrust Investigations and Litigation

On March 25, 2014, representatives of the European Commission (EC) were at Tenneco GmbH's Edenkoben, Germany administrative facility to gather information in connection with an ongoing global antitrust investigation concerning multiple automotive suppliers. On the same date, the Company also received a related subpoena from the U.S. Department of Justice (“DOJ”).

On November 5, 2014, the DOJ granted conditional leniency to Tenneco, its subsidiaries and its 50% affiliates as of such date ("2014 Tenneco Entities") pursuant to an agreement the Company entered into under the Antitrust Division's Corporate Leniency Policy. This agreement provides important benefits to the 2014 Tenneco Entities in exchange for the Company's self-reporting of matters to the DOJ and its continuing full cooperation with the DOJ's resulting investigation. For example, the DOJ will not bring any criminal antitrust prosecution against the 2014 Tenneco Entities, nor seek any criminal fines or penalties, in connection with the matters the Company reported to the DOJ. Additionally, there are limits on the liability of the 2014 Tenneco Entities related to any follow-on civil antitrust litigation in the United States. The limits include single rather than treble damages, as well as relief from joint and several antitrust liability with other relevant civil antitrust action defendants. These limits are subject to the Company satisfying the DOJ and any court presiding over such follow-on civil litigation.

On April 27, 2017, the Company received notification from the EC that it has administratively closed its global antitrust inquiry regarding the production, assembly, and supply of complete exhaust systems. No charges against the Company or any other competitor were initiated at any time and the EC inquiry is now closed.

Certain other competition agencies are also investigating possible violations of antitrust laws relating to products supplied by the Company and its subsidiaries, including Federal-Mogul. The Company has cooperated and continues to cooperate fully with all of these antitrust investigations, and take other actions to minimize its potential exposure.

The Company and certain of its competitors are also currently defendants in civil putative class action litigation, and are subject to similar claims filed by other plaintiffs, in the United States and Canada. More related lawsuits may be filed, including in other jurisdictions. Plaintiffs in these cases generally allege that defendants have engaged in anticompetitive conduct, in violation of federal and state laws, relating to the sale of automotive exhaust systems or components thereof. Plaintiffs seek to recover, on behalf of themselves and various purported classes of purchasers, injunctive relief, damages and attorneys' fees. However, as explained above, because the DOJ granted conditional leniency to the 2014 Tenneco Entities, the Company's civil liability in U.S. follow-on actions with respect to these entities is limited to single damages and the Company will not be jointly and severally liable with the other defendants, provided that the Company has satisfied its obligations under the DOJ leniency agreement and approval is granted by the presiding court. Typically, exposure for follow-on actions in Canada is less than the exposure for U.S. follow-on actions.

Following the EC's decision to administratively close its antitrust inquiry into exhaust systems in 2017, receipt by the 2014 Tenneco Entities of conditional leniency from the DOJ and discussions during the third quarter of 2017 following the appointment of a special settlement master in the civil putative class action cases pending against the

Company and/or certain of its competitors in the United States, the Company continues to vigorously defend itself and/or take actions to minimize its potential exposure to matters pertaining to the global antitrust investigation, including engaging in settlement discussions when it is in the best interests of the Company and its stockholders. For example, in October 2017, the Company settled an administrative action brought by Brazil's competition authority for an amount that was not material. In December 2018, the Company settled a separate administrative action brought by Brazil's competition authority against a Federal-Mogul subsidiary, also for an amount that was not material. Additionally, in February 2018, the Company settled civil putative class action litigation in the United States brought by classes of direct purchasers, end-payors and auto dealers. No other classes of plaintiffs have brought claims against the Company in the United States. Based upon those earlier developments, including settlement discussions, The Company established a reserve of $132 million in its second quarter 2017 financial results for settlement costs that were probable, reasonably estimable, and expected to be necessary to resolve its antitrust matters globally, which primarily involves the resolution of civil suits and

TENNECO INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

related claims. Of the $132 million reserve that was established, $79 million was paid through December 31, 2018 resulting in a remaining reserve of $53 million as of December 31, 2018, which is recorded in accrued expenses and other current liabilities in the Company's consolidated balance sheets. While the Company, including its Federal-Mogul subsidiaries, continues to cooperate with certain competition agencies investigating possible violations of antitrust laws relating to products supplied by the Company, and the Company may be subject to other civil lawsuits and/or related claims, no amount of this reserve is attributable to matters with the DOJ or the EC, and no such amount is expected based on current information.

The Company's reserve for its antitrust matters is based upon all currently available information and an assessment of the probability of events for those matters where the Company can make a reasonable estimate of the costs to resolve such outstanding matters. The Company's estimate involves significant judgment, given the number, variety and potential outcomes of actual and potential claims, the uncertainty of future rulings and approvals by a court or other authority, the behavior or incentives of adverse parties or regulatory authorities, and other factors outside of its control. As a result, the Company's reserve may change from time to time, and actual costs may vary. Although the ultimate outcome of any legal matter cannot be predicted with certainty, based on current information, the Company does not expect that any such change in the reserve will have a material adverse impact on the Company's annual consolidated financial position, results of operations or liquidity.

Other Legal Proceedings, Claims and Investigations

For many years the Company has been and continues to be subject to lawsuits initiated by claimants alleging health problems as a result of exposure to asbestos. The Company's current docket of active and inactive cases is less than 500 cases in the United States and less than 50 in Europe.

With respect to the claims filed in the United States, the substantial majority of the claims are related to alleged exposure to asbestos in the Company's line of Walker® exhaust automotive products although a significant number of those claims appear also to involve occupational exposures sustained in industries other than automotive. A small number of claims have been asserted against one of the Company's subsidiaries by railroad workers alleging exposure to asbestos products in railroad cars. The Company believes, based on scientific and other evidence, it is unlikely that U.S. claimants were exposed to asbestos by the Company's former products and that, in any event, they would not be at increased risk of asbestos-related disease based on their work with these products. Further, many of these cases involve numerous defendants, with the number in some cases exceeding 100 defendants from a variety of industries. Additionally, in many cases the plaintiffs either do not specify any, or specify the jurisdictional minimum, dollar amount for damages.

With respect to the claims filed in Europe, the substantial majority relate to occupational exposure claims brought by current and former employees of Federal-Mogul facilities in France and amounts paid out were not material. A small number of occupational exposure claims have also been asserted against Federal-Mogul entities in Italy and Spain.

As major asbestos manufacturers and/or users continue to go out of business or file for bankruptcy, the Company may experience an increased number of these claims. The Company vigorously defends itself against these claims as part of its ordinary course of business. In future periods, the Company could be subject to cash costs or charges to earnings if any of these matters are resolved unfavorably to the Company. To date, with respect to claims that have proceeded sufficiently through the judicial process, the Company has regularly achieved favorable resolutions. Accordingly, the Company presently believes that these asbestos-related claims will not have a material adverse impact on the Company's annual consolidated financial position, results of operations or liquidity.

In connection with Federal-Mogul's emergence from bankruptcy in 2008, trusts were funded and established to assume liability for and resolve Federal-Mogul's legacy asbestos liabilities in the United States and United Kingdom. Accordingly, those legacy liabilities in the United States and United Kingdom have had no ongoing impact on Federal-Mogul, Tenneco or their operations.

The Company is also from time to time involved in other legal proceedings, claims or investigations. Some of these matters involve allegations of damages against the Company relating to environmental liabilities (including toxic tort, property damage and remediation), intellectual property matters (including patent, trademark and copyright infringement, and licensing disputes), personal injury claims (including injuries due to product failure, design or warning issues, and other product liability related matters), taxes, unclaimed property, employment matters, and commercial or contractual disputes, sometimes related to acquisitions or divestitures. Additionally, some of these matters involve allegations relating to legal compliance.

While the Company vigorously defends itself against all of these legal proceedings, claims and investigations and take other actions to minimize its potential exposure, in future periods, the Company could be subject to cash costs or charges to earnings if any of these matters are resolved on unfavorable terms. Although the ultimate outcome of any legal matter cannot be predicted with certainty, based on current information, including the Company's assessment of the merits of the particular claim, except as described above under "Antitrust Investigations", the Company does expect the legal proceedings, claims or investigations currently pending against it will have any material adverse impact on its annual consolidated financial position, results of operations or liquidity.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Asset Retirement Obligations

As a result of the Acquisition, the Company acquired liabilities related to asset retirement obligations (ARO). The Company did not have ARO liabilities as of December 31, 2017. The Company’s primary ARO activities relate to the removal of hazardous building materials at its facilities. The Company records an ARO at fair value upon initial recognition when the amount is probable and can be reasonably estimated. ARO fair values are determined based on the Company’s determination of what a third party would charge to perform the remediation activities, generally using a present value technique.

The Company maintains ARO liabilities in the consolidated balance sheets as follows:

	December 31 2018
	(Millions)
Accrued expenses and other current liabilities	$ 3
Deferred credits and other liabilities	12
	$ 15

The following is a rollforward of the Company’s ARO liability for the year ended December 31, 2018 (in millions):

	December 31 2018
	(Millions)
Balance as of December 31, 2017	$ —
Acquisition of Federal-Mogul	12
Liabilities incurred	3
Liabilities settled/adjustments	—
Balance as of December 31, 2018	$ 15

Warranty Matters

The Company provides warranties on some of its products. The warranty terms vary but range from one year up to limited lifetime warranties on some of its premium aftermarket products. Provisions for estimated expenses related to product warranty are made at the time products are sold or when specific warranty issues are identified with the Company's products. These estimates are established using historical information about the nature, frequency, and average cost of warranty claims. The Company believes the warranty reserve is appropriate; however, actual claims incurred could differ from the original estimates, requiring adjustments to the reserve. The reserve is included in both current and long-term liabilities on the consolidated balance sheets.

Below is a table that shows the activity in the warranty accrual accounts:

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
Beginning balance	$32	$27	$23
Acquisition of Federal-Mogul	17	—	—
Accruals related to product warranties	14	15	19
Reductions for payments made	(18)	(10)	(15)
Ending balance	$45	$32	$27

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16. Share-Based Compensation

The Company's current long-term incentive compensation plan, which was originally adopted in 2006 and amended in 2009, 2013 and 2018, is known as the Tenneco Inc. 2006 Long-Term Incentive Plan (2006 LTIP). The types of awards that may be granted under the 2006 LTIP are stock-options (both incentive and non-qualified stock options), stock appreciation rights (SARs), Full Value Awards (including bonus stock, stock units, restricted stock, restricted stock units (RSUs), deferred stock units, performance stock, and performance stock units (PSUs), and cash incentive awards (including long-term performance units (LTPUs) and cash settled RSUs).

On September 12, 2018, the stockholders of the Company approved an amendment to the 2006 LTIP to increase the shares of common stock available thereunder to 3.0 million. Share-settled awards are settled through the issuance of new shares of Class A Common Stock. As of December 31, 2018, up to 14.8 million shares of the Company's Class A Common Stock are authorized to be issued under its 2006 LTIP, of which approximately 4,034,413 shares remain authorized for granting under the plan.

In 2018, the Company prospectively changed its vesting policy regarding retirement eligibility and now require a retirement eligible employee (or an employee who becomes retirement eligible) to provide at least one year of service from the grant date in order for the award to vest. If an employee becomes retirement eligible after the first year of vesting but before completion of the three-year term, the Company amortizes the expense for the share-based awards over a period starting at the grant date to the date an employee becomes retirement eligible. Prior to 2018, for employees eligible to retire at grant date, the Company immediately expensed the granted awards.

Director restricted stock awards generally vest on the date of grant. Stock options, RSUs (both cash-settled and share-settled) and restricted stock are time-based service awards and generally vest according to a three-year graded vesting schedule. One-third of the award will vest on the first anniversary of the grant date, one-third of the award will vest on the second anniversary and one-third of the award will vest on the third anniversary.

LTPU and PSU awards generally have a three-year performance period and cliff vest at the end of the period based upon achievement of performance and market targets established at the time of grant. Generally 50% of the award is based on performance targets and 50% is based on market targets. The market target for both LTPUs and PSU is Company total shareholder return (TSR) percentile ranking among peer companies with TSR defined as change in stock price plus dividends paid divided by beginning stock price. The LTPUs have two performance targets, Cumulative EBITDA and Cumulative free cash flow, which are defined in the award. The PSUs have one performance target, Cumulative economic value added, which is defined in the award.

Director restricted stock, restricted stock and RSUs (cash-settled and share-settled) will participate in any dividends during the vesting period, which are subject to the same vesting terms of the award. The dividends are generally paid in cash on the settlement date of the award.

The fair value of restricted stock and RSUs (cash-settled and share-settled) are determined using the average of the high and low trading price of our common stock on the date of measurement. The fair value of LTPU’s and PSUs are determined using the probability weighted factors for performance conditions combined with Monte Carlo simulation model for market conditions. The Monte Carlo model utilizes multiple input variables that determine the probability of satisfying the market condition stipulated in the award and calculated the fair value of the award. The starting stock price is based on the trailing 20-day closing stock price as of the beginning of the performance period and the closing stock price on the valuation date, as well as the respective stock prices for component companies. The risk-free rate is based on yields observed on the U.S. Treasury constant maturity notes with a term equal to the remaining term of the award being measured. Expected volatilities utilized in the model are based on historical volatility of the Company

and the companies in the S&P 500 index using daily stock price returns prior to the valuation date, commensurate with the remaining performance period at the measurement date. The cross correlation among stock price returns of the Company and each of the component companies in the S&P 500 with the S&P 500 Index are calculated based on daily returns over the trailing period commensurate with the remainder of the performance period at the valuation date.

For our restricted stock, share-settled RSUs and PSUs that have not yet vested, we estimate forfeitures by taking the average of the past actual forfeiture rate for these grants.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Cash-Settled Awards
Prior to 2018, the Company has granted RSUs and LTPUs to certain key employees that are payable in cash. These awards are classified as liabilities and are valued based on the fair value of the award at the grant date and are remeasured at each reporting date until settlement with compensation expense being recognized in proportion to the completed requisite period up until date of settlement. At December 31, 2018, the LTPUs outstanding included a three-year grant for 2016-2018 payable in the first quarter of 2019, and a three-year grant for 2017-2019 payable in the first quarter of 2020.

Total share-based compensation expense (net of taxes) for the cash-settled awards was a benefit of $1 million in 2018, and an expense of $4 million and $10 million in 2017 and 2016, respectively. Share-based compensation expense is included in selling, general and administrative expenses in the consolidated statements of income. As of December 31, 2018, $2 million of total unrecognized compensation costs is expected to be recognized on the cash-settled awards over a weighted-average period of approximately 1 year.

Share-Settled Awards
The Company has granted restricted stock and stock options to its directors and certain key employees. In addition, beginning in 2018, the Company has granted RSUs and PSUs that are payable in common stock to certain key employees. These awards are settled in shares upon vesting with compensation expense being recognized based on the grant date fair value recognized ratably over the requisite service period if it is probable that the performance target related to the PSUs will be achieved and subsequently adjusted if the probability assessment changes.

Total share-based compensation expense (net of taxes) for the share-settled awards for the years ended December 31, 2018, 2017, and 2016 was $11 million, $11 million and $9 million, respectively. Share-based compensation expense is included in selling, general and administrative expenses in the consolidated statements of income.

Stock Options
The Company's nonqualified stock options generally have seven-year terms. There have been no stock options granted since 2014 and all options are currently vested. As such, there was no unrecognized compensation cost related to the Company's stock option awards as of December 31, 2018.

The following table reflects the status and activity for all options to purchase common stock for the period indicated:

	Year Ended December 31, 2018			
	Shares Under Option	Weighted Avg. Exercise Prices	Weighted Avg. Remaining Life in Years	Aggregate Intrinsic Value (Millions)
Options outstanding, January 1, 2018	318,016	$ 46.18	2.3	$ 5
Granted	—	—		
Exercised	(21,823)	29.79		
Forfeited/expired	(2,196)	55.50		
Options outstanding, December 31, 2018	293,997	46.89	1.4	$ —

Cash received from stock option exercises was $1 million in 2018, $8 million in 2017, and $16 million in 2016. Stock options exercised generated a tax shortfall of less than $1 million in 2018, and an excess tax benefit of $2 million in 2017 and $1 million in 2016.

As of December 31, 2018, all outstanding options are exercisable. The total intrinsic value of options exercised during the years ended December 31, 2018, 2017, and 2016 was less than $1 million, $6 million and $11 million, respectively.

As mentioned above, there have been no stock options granted since 2014. Accordingly, no options vested in 2018. The total fair value of shares vested from options that were granted prior to 2015 was $2 million in 2017 and $4 million in 2016.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Restricted Stock, Share-Settled RSUs and PSUs
The following table reflects the status for all nonvested restricted stock, share-settled RSUs and PSUs for the period indicated:

	Restricted Stock		Share-Settled RSUs		PSUs	
	Shares	Weighted Avg. Grant Date Fair Value	Units	Weighted Avg. Grant Date Fair Value	Units	Weighted Avg. Grant Date Fair Value
Nonvested balance at January 1, 2018	410,251	$ 53.36	—	$ —	—	$ —
Granted	19,727	54.19	467,358	48.48	248,928	49.32
Vested	(237,342)	51.17	(192)	55.04	—	—
Forfeited	(14,086)	60.87	(26,763)	55.04	(21,879)	50.75
Nonvested balance at December 31, 2018	178,550	55.46	440,403	47.99	227,049	49.18

At December 31, 2018, the PSUs outstanding represent a three-year grant for 2018-2020 payable in the first quarter of 2021.

The total fair value of restricted stock vested was $11 million in 2018, $14 million in 2017, and $9 million in 2016.

As of December 31, 2018, approximately $25 million of total unrecognized compensation costs is expected to be recognized on the share-settled awards over a weighted-average period of approximately two years.

17. Shareholders' Equity

Common Stock

Common Stock Outstanding
As discussed in Note 3, Acquisitions and Divestitures, and pursuant to the Amended and Restated Certificate of Incorporation, Class B Common Stock was created, and the Company's existing common stock was reclassified as Class A Common Stock.

The Company has authorized 175,000,000 shares and 135,000,000 shares ($0.01 par value) of Class A Common Stock at December 31, 2018 and 2017. The Company has authorized 25,000,000 shares ($0.01 par value) of Class B Common Stock at December 31, 2018.

Total common stock outstanding and changes in common stock issued are as follows:

	Class A Common Stock			Class B Common Stock
	Year Ended December 31			Year Ended December 31
	2018	2017	2016	2018
Shares issued, beginning balance	66,033,509	65,891,930	65,067,132	—
Share issuances (1)	5,651,177	—	—	23,793,669
Issuance pursuant to benefit plans	19,919	34,760	292,514	—
Restricted stock forfeited and withheld for taxes	(51,049)	(126,682)	—	—
Stock options exercised	21,823	233,501	532,284	—

Shares issued, ending balance	71,675,379	66,033,509	65,891,930	23,793,669
Treasury stock	14,592,888	14,592,888	11,655,938	—
Total shares outstanding	57,082,491	51,440,621	54,235,992	23,793,669

(1) Represents an aggregate of 29,444,846 shares of Common Stock delivered to AEP as the Stock Consideration related to Federal-Mogul Acquisition. See Note 3, Acquisitions and Divestitures for additional information.

The rights of the Class A Common Stock and Class B Common Stock are the same, except with respect to voting and conversion. Holders of Class A Common Stock are entitled to one vote per share and holders of Class B Common Stock are not entitled to vote unless a proposed action would diminish their rights, powers or privileges, in which case such action must be unanimously approved by the holders of the Class B Common Stock. Holders of Class A Common Stock have no right to

convert their shares into other securities. Each share of Class B Common Stock will automatically convert into a share of Class A Common Stock upon transfer, with limited exceptions. In addition, if the proposed spin-off of the Company's aftermarket and ride performance business (the "Spin-Off") does not occur by April 1, 2020, each holder of Class B Common Stock may convert its shares into an equal number of shares of Class A Common Stock, provided that the initial Class B holders would not own, in the aggregate, more than 15 percent of the Class A Common Stock following such conversion.

Shareholder Agreement

In connection with the closing of the Federal-Mogul acquisition, on October 1, 2018, the Company, AEP, IEP, and Icahn Enterprises Holdings L.P. ("IEH") entered into a Shareholders Agreement (the "Shareholders Agreement").

Pursuant to the Shareholders Agreement, a designee of IEP will be nominated to the Company's board of directors (the "Board") at each annual meeting of stockholders until the earlier of the Spin-Off date and the date IEP and its affiliates own less than 10% of the outstanding Class A Common Stock and Class B Common Stock, measured as a single class (the "Outstanding Shares").

The Shareholders Agreement prohibits IEP and its affiliates from taking certain actions until the earlier of (i) April 1, 2020, if the Spin-Off has not occurred, and (ii) one year after the date on which IEP and its affiliates cease to own at least 5% of the Outstanding Shares. Prohibited actions include: (i) acquisitions of stock or other securities or any material assets of the Company or any subsidiaries (subject to some exceptions); (ii) participating in a proxy solicitation; (iii) announcing or proposing any extraordinary business combination transaction; and (iv) otherwise seeking to control or influence control of the management, the Board or the policies of the Company.

Until the later of (i) the expiration of the standstill restrictions discussed above and (ii) the time when IEP and its affiliates cease to own at least 10% of the Outstanding Shares, IEP and its affiliates may not transfer any shares (a) to certain specified types of investors and (b) in an amount equal to 5% or more of the Class A Common Stock issued and outstanding (subject to certain carve outs for transfers to certain passive institutional investors).

For so long as IEP and its affiliates own at least 10% of the Outstanding Shares, if the Company proposes to issue any equity securities (other than in an excluded issuance), IEP and its affiliates have certain preemptive rights. The Shareholders Agreement also includes registration rights for IEP.

Share Repurchase Program

During 2015, the Company's Board of Directors approved a share repurchase program, authorizing it to repurchase up to $550 million of its outstanding class A common stock over a three-year period ("2015 Program"). The Company purchased 4,182,613 shares in 2016 through open market purchases, which were funded through cash from operations, at a total cost of $225 million, at an average price of $53.89 per share. These repurchased shares are held as part of the Company's treasury stock.

In February 2017, the Company's Board of Directors authorized the repurchase of up to $400 million of its outstanding common stock over the next three years ("2017 Program"). The 2017 Program included $112 million that remained authorized under the 2015 Program. The Company generally acquires the shares through open market or privately negotiated transactions, and has historically utilized cash from operations. The repurchase program does not obligate the Company to repurchase shares within any specific time or situations.

The Company purchased 2,936,950 shares in 2017 through open market purchases at a total cost of $169 million, at an average price of $57.57 per share. These repurchased shares are held as part of the Company's treasury stock which

increased to 14,592,888 at December 31, 2017 from 11,655,938 at December 31, 2016. As of December 31, 2018, approximately $231 million remained authorized for share repurchases under the 2017 Program.

In 2018, no shares were repurchased under the 2017 Program. No new share repurchase programs were authorized by the Board of Directors in 2018.

Preferred Stock

The Company had 50,000,000 shares of preferred stock ($0.01 par value) authorized at both December 31, 2018 and 2017. No shares of preferred stock were issued or outstanding at those dates.

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18. Changes in Accumulated Other Comprehensive Income (Loss) by Component

The following represents the Company's changes in accumulated other comprehensive income (loss) by component for the years ended December 31, 2018, 2017, and 2016:

	Year Ended December 31		
	2018	2017	2016
	(In millions)		
Foreign currency translation adjustment:			
Balance at beginning of year	$(263)	$(367)	$(315)
Other comprehensive income (loss) before reclassifications	(134)	104	(49)
Income tax provision (benefit)	2	—	(3)
Other comprehensive income (loss), net of tax	(132)	104	(52)
Balance at end of period	(395)	(263)	(367)
Pension and postretirement benefits:			
Balance at beginning of year	(275)	(292)	(343)
Other comprehensive income (loss) before reclassifications	(47)	2	61
Reclassification to earnings	22	26	19
Other comprehensive income (loss) before tax	(25)	28	80
Income tax provision (benefit)	3	(11)	(29)
Other comprehensive income (loss), net of tax	(22)	17	51
Balance at end of period	$(297)	$(275)	$(292)
Other comprehensive income (loss) attributable to noncontrolling interests, net of tax	$(2)	$2	$(4)

19. Earnings per Share

The Company computes basic earnings per share by dividing income available to common shareholders by the weighted average number of common shares outstanding. The computation of diluted earnings per share is similar to the computation of basic earnings per share, except that the Company adjusts the weighted average number of shares outstanding to include estimates of additional shares that would be issued if potentially dilutive common shares had been issued. In addition, the Company adjusts income available to common shareholders to include any changes in income or loss that would result from the assumed issuance of the dilutive common shares.

Earnings per share of common stock outstanding were computed as follows:

	Year Ended December 31		
	2018	2017	2016
	(Millions Except Share and Per Share Amounts)		
Net income attributable to Tenneco Inc.	$55	$ 198	$ 347
Basic earnings per share —			
Average shares of common stock outstanding	58,625,502	52,796,184	55,939,135
Earnings per average share of common stock	$0.93	$ 3.75	$ 6.20
Diluted earnings per share —			
Average shares of common stock outstanding	58,625,502	52,796,184	55,939,135
Effect of dilutive securities:			
Restricted stock and RSUs	93,546	111,062	175,513

Stock options	40,099	119,665	292,788
Average shares of common stock outstanding including dilutive securities	58,758,730	57,026,911	56,407,436
Earnings per average share of common stock	$0.93	$ 3.73	$ 6.15

For the years ended December 31, 2018, 2017 and 2016, the weighted average number of anti-dilutive potential common shares excluded from the calculation above totaled 257,567 shares, 834 shares and 134,361 shares, respectively.

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20. Segment and Geographic Area Information

In the first quarter of 2018, the Company's reportable segments were revised to reflect the Clean Air, Ride Performance, and Aftermarket businesses. Until the fourth quarter of 2018, the three reportable segments were also the Company's operating segments, and aligned with how the Chief Operating Decision Maker ("CODM") allocated resources and assessed performance against key growth strategies.

As discussed in Note 3, Acquisitions and Divestitures, the Company completed the Acquisition of Federal-Mogul on October 1, 2018 and its results are included in the Powertrain and Motorparts segments. As a result, it was determined the Company has five operating segments consisting of Clean Air, Ride Performance, Aftermarket, Powertrain, and Motorparts businesses. This structure is consistent with how the CODM allocates resources and assesses performance.

With respect to the five segments:

- The Clean Air segment designs, manufactures and distributes a variety of products and systems designed to reduce pollution and optimize engine performance, acoustic tuning and weight on a vehicle for OEMs.
- The Ride Performance segment designs, manufactures and distributes a variety of products and systems designed to reduce and control excessive roll, pitch and bounce of a vehicle through the suspension system for OEM customers.
- The Aftermarket segment designs, manufactures and distributes replacement products for the automotive parts industry including ride performance and clean air products.
- The Powertrain segment focuses on original equipment powertrain products for automotive, heavy duty, and industrial applications.
- The Motorparts segment sells and distributes a broad portfolio of products in the global aftermarket, while also serving OEMs with products including, braking, wipers, and a limited range of chassis components.

As a result of the Acquisition, management changed its key performance measure of segment profitability. Management now uses EBITDA including noncontrolling interests as the key performance measure of segment profitability and uses the measure in its financial and operational decision making processes, for internal reporting, and for planning and forecasting purposes to effectively allocate resources. EBITDA including noncontrolling interests is defined as earnings before interest expense, income taxes, noncontrolling interests, and depreciation and amortization. Prior period operating segment results have been retrospectively recast to reflect the Company's current operating segments and change in key performance measure for segment profitability. Segment assets are not presented as it is not a measure reviewed by the CODM in allocating resources and assessing performance.

EBITDA including noncontrolling interests should not be considered a substitute for results prepared in accordance with US GAAP and should not be considered an alternative to net income, which is the most directly comparable financial measure to EBITDA including noncontrolling interests that is in accordance with US GAAP. EBITDA including noncontrolling interests, as determined and measured by the Company, should not be compared to similarly titled measures reported by other companies.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Segment results for 2018, 2017 and 2016 are as follows:

	Reportable Segments								
	Clean Air	Ride Performance	Aftermarket	Powertrain	Motorparts	Total	Other	Reclass & Elims	Total
	(Millions)								
At December 31, 2018, and for the Year Ended									
Revenues from external customers	$6,707	$ 1,949	$ 1,221	$ 1,112	$ 774	$11,763	$ —	$ —	$11,763
Intersegment revenues	—	22	—	40	10	72	—	(72)	—
EBITDA including noncontrolling interests	597	66	169	92	(39)	885	(234)	—	651
At December 31, 2017, and for the Year Ended									
Revenues from external customers	$6,216	$ 1,807	$ 1,251	$ —	$ —	$9,274	$ —	$ —	$9,274
Intersegment revenues	—	22	—	—	—	22	—	(22)	—
EBITDA including noncontrolling interests	562	124	193	—	—	879	(245)	—	634
At December 31, 2016, and for the Year Ended									
Revenues from external customers	$5,764	$ 1,593	$ 1,240	$ —	$ —	$8,597	$ —	$ —	$8,597
Intersegment revenues	—	26	—	—	—	26	—	(26)	—
EBITDA including noncontrolling interests	561	153	207	—	—	921	(229)	—	692

Segment EBITDA including noncontrolling interests and the reconciliation to earnings before interest expense, income taxes, and noncontrolling interests are as follow:

	Year Ended December 31		
	2018	2017	2016
	(Millions)		
EBITDA including noncontrolling interests by Segments:			
Clean Air	$597	$562	$561
Ride Performance	66	124	153
Aftermarket	169	193	207
Powertrain	92	—	—
Motorparts	(39)	—	—
Other	(234)	(245)	(229)
Total EBITDA including noncontrolling interests	651	634	692
Less: Depreciation and amortization	(345)	(226)	(213)
Earnings before interest expense, income taxes, and noncontrolling interests	$306	$408	$479
Less: Interest expense	132	72	68
Less: Income tax expense (benefit)	63	71	(4)
Net income	$111	$265	$415

The following customers accounted for 10% or more of the Company's net sales in the last three years. The net sales to both customers were across all segments.

Customer	2018	2017	2016
General Motors Company	12 %	14 %	17 %
Ford Motor Company	12 %	13 %	13 %

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	Revenues from external customers [b]			Long-lived assets [c]	
	Year Ended December 31			December 31	
	2018	2017	2016	2018	2017
	(Millions)				
United States	$4,488	$3,632	$3,512	$1,341	$655
China	1,553	1,283	1,186	687	280
Germany	1,212	798	764	543	144
Poland	731	488	385	319	219
United Kingdom	499	482	387	116	48
Mexico	543	416	352	239	75
India	316	216	159	167	46
Turkey	7	9	9	276	—
Other Foreign [a]	2,414	1,950	1,843	687	298
Reclass & Elims	—	—	—	(107)	—
Consolidated	$11,763	$9,274	$8,597	$4,268	$1,765

(a) Revenues from external customers and long-lived assets for individual foreign countries other than China, Germany, Poland, United Kingdom, Mexico, India, and Turkey are not material.
(b) Revenues are attributed to countries based on location of the shipper.
(c) Long-lived assets include all long-term assets except goodwill, intangibles and deferred tax assets.

Disaggregation of revenue
Original Equipment
Value added: OE revenue is generated from providing original equipment manufacturers and servicers with products for automotive, heavy duty, and industrial applications. Supply relationships typically extend over the life of the related vehicle, subject to interim design and technical specification revisions, and do not require the customer to purchase a minimum quantity.
Substrate/Pass through sales: Generally, in connection with the sale of exhaust systems to certain OE manufacturers, the Company purchases catalytic converters and diesel particulate filters or components thereof including precious metals (“substrates”) on behalf of its customers which are used in the assembled system. These substrates are included in inventory and are “passed through” to the customer at cost, plus a small margin. Since the Company takes title to the substrate inventory and has responsibility for both the delivery and quality of the finished product including the substrates, the revenues and related expenses are recorded at gross amounts. Revenues recognized for substrate sales were $2,500 million, $2,187 million, and $2,028 million for the years ended December 31, 2018, 2017 and 2016.

Aftermarket
Aftermarket revenue is generated from providing products for the global vehicle aftermarket to a wide range of warehouse distributors, retail parts stores, and mass merchants that distribute these products to customers ranging from professional service providers to “do-it-yourself” consumers.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

Revenue from contracts with customers is disaggregated by product lines, as it depicts the nature and amount of the Company's revenue that is aligned with the Company's key growth strategies. In the following table, revenue is disaggregated accordingly:

By Customer Type	Reportable Segments					
	Clean Air	Ride Performance	Aftermarket	Powertrain	Motorparts	Total
	(Millions)					
Year Ended December 31, 2018						
OE - Substrate	$2,500	$ —	$ —	$ —	$ —	$2,500
OE - Value add	4,207	1,949	—	1,112	—	7,268
Aftermarket	—	—	1,221	—	774	1,995
Total	$6,707	$ 1,949	$ 1,221	$ 1,112	$ 774	$11,763
Year Ended December 31, 2017						
OE - Substrate	$2,187	$ —	$ —	$ —	$ —	$2,187
OE - Value add	4,029	1,807	—	—	—	5,836
Aftermarket	—	—	1,251	—	—	1,251
Total	$6,216	$ 1,807	$ 1,251	$ —	$ —	$9,274
Year Ended December 31, 2016						
OE - Substrate	$2,028	$ —	$ —	$ —	$ —	$2,028
OE - Value add	3,736	1,593	—	—	—	5,329
Aftermarket	—	—	1,240	—	—	1,240
Total	$5,764	$ 1,593	$ 1,240	$ —	$ —	$8,597

By Geography	Reportable Segments					
	Clean Air	Ride Performance	Aftermarket	Powertrain	Motorparts	Total
	(Millions)					
Year Ended December 31, 2018						
North America	$2,981	$ 721	$ 758	$ 386	$ 408	$5,254
EMEA	2,415	801	399	498	290	4,403
ROW	1,311	427	64	228	76	2,106
Total	$6,707	$ 1,949	$ 1,221	$ 1,112	$ 774	$11,763
Year Ended December 31, 2017						
North America	$2,866	$ 674	$ 786	$ —	$ —	$4,326
EMEA	2,143	736	404	—	—	3,283
ROW	1,207	397	61	—	—	1,665
Total	$6,216	$ 1,807	$ 1,251	$ —	$ —	$9,274
Year Ended December 31, 2016						
North America	$2,767	$ 652	$ 818	$ —	$ —	$4,237
EMEA	1,872	604	370	—	—	2,846
ROW	1,125	337	52	—	—	1,514
Total	$5,764	$ 1,593	$ 1,240	$ —	$ —	$8,597

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS - (Continued)

The following table shows the asset expenditure information by reportable segments:

	Year Ended December 31, 2018						
	Clean Air	Ride Performance	Aftermarket	Powertrain	Motorparts	Other unallocated assets	Total
	(Millions)						
Prior year payable on assets	$33	$ 22	$ 4	$ —	$ —	$ —	$59
Asset additions	202	121	38	81	43	56	541
Less: Current year payable on assets	(38)	(23)	(7)	(23)	(2)	—	(93)
Cash payments for property, plant, and equipment	$197	$ 120	$ 35	$ 58	$ 41	$ 56	$507

	Year Ended December 31, 2017						
	Clean Air	Ride Performance	Aftermarket	Powertrain	Motorparts	Other unallocated assets	Total
	(Millions)						
Prior year payable on assets	$						