UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2017

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	**76-0515284**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
500 North Field Drive Lake Forest, IL	**60045**
(Address of principal executive offices)	(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
Common Stock, par value $.01 per share	New York and Chicago Stock Exchanges

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

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☑ No ☐

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

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 ☑ No ☐

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

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

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

Large accelerated filer ☑	Accelerated filer ☐
Non-accelerated filer ☐	Smaller reporting company ☐
(Do not check if a 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 ☑

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant as of June 30, 2017, 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, 2017, was approximately $3.0 billion.

Common Stock, par value $.01 per share, outstanding as of February 23, 2018 was 51,429,153.

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 16, 2018	Part III

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, including the section entitled "Outlook" appearing in Item 7 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 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;
- 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 light trucks, which tend to be higher margin products for our customers and us, to other lower margin vehicles, for which we may or may not have supply arrangements;
- changes in consumer demand for our automotive, commercial 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;
- 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 automobile 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);
- the loss of any of our large original equipment manufacturer ("OEM") 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 OEMs or any change in customer demand due to delays in the adoption or enforcement of worldwide emissions regulations;
- 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;
- 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;
- increases in the costs of raw materials, including our ability to successfully reduce the impact of any such cost increases through materials substitutions, cost reduction initiatives, customer recovery and other methods;
- 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;
- 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;
- 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;
- the impact of consolidation among vehicle parts suppliers and customers on our ability to compete;

- changes in distribution channels or competitive conditions in the markets and countries where we operate, including the impact of increasing competition from lower cost, private-label products on our aftermarket business;
- customer acceptance of new products;
- our ability to realize our business strategy of improving operating performance;
- our ability to successfully integrate, and benefit from, any acquisitions that we complete and effectively manage our joint ventures and other third-party relationships;
- 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;
- the potential impairment in the carrying value of our long-lived assets and goodwill or our deferred tax assets;
- potential volatility in our effective tax rate;
- natural disasters, such as earthquakes and flooding, and any resultant disruptions in the supply or production of goods or services to us or by us or in demand by our customers;
- 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; and
- the timing and occurrence (or non-occurrence) of other transactions, events and circumstances which may be beyond our control.

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 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 distributes highly engineered products for both original equipment vehicle manufacturers ("OEMs") and the repair and replacement markets, or aftermarket, worldwide. We are one of the world's largest producers of clean air and ride performance products and systems for light vehicle, commercial truck, off-highway and other vehicle applications. As used herein, the term "Tenneco," "we," "us," "our," or the "Company" refers to Tenneco Inc. and 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. Building a stronger presence in these markets complements our core businesses of supplying ride performance and clean air products and systems to original equipment and aftermarket customers worldwide. Our common stock is traded on the New York Stock Exchange ("NYSE") and the Chicago Stock Exchange under the symbol "TEN."

Corporate Governance and Available Information

We have established a comprehensive approach to corporate governance for the purpose of defining responsibilities, setting high standards of professional and personal conduct and assuring compliance with such responsibilities and standards. As part of its annual review process, the Board of Directors monitors developments in the area of corporate governance. Listed below are some of the key elements of our corporate governance policies.

For more information about these matters, see our definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2018.

Independence of Directors

- Eight of our ten directors are independent under the NYSE listing standards.
- Independent directors are scheduled to meet separately in executive session after every regularly scheduled Board of Directors meeting.
- We have a lead independent director, Mr. Paul T. Stecko.

Audit Committee

- All members meet the independence standards for audit committee membership under the NYSE listing standards and applicable Securities and Exchange Commission ("SEC") rules.
- Two members of the Audit Committee, Mr. Dennis J. Letham and Mr. Thomas C. Freyman, have been designated by the Board as "audit committee financial experts," as defined in the SEC rules, and all members of the Audit Committee satisfy the NYSE's financial literacy requirements.
- The Audit Committee operates under a written charter which governs its duties and responsibilities, including its sole authority to appoint, review, evaluate and replace our independent auditors.
- The Audit Committee has adopted policies and procedures governing the pre-approval of all audit, audit-related, tax and other services provided by our independent auditors.

Compensation/Nominating/Governance Committee

- All members meet the independence standards for compensation and nominating committee membership under the NYSE listing standards and applicable SEC rules.
- The Compensation/Nominating/Governance Committee operates under a written charter that governs its duties and responsibilities, including the responsibility for executive compensation.
- We have an Executive Compensation Subcommittee which has the responsibility to consider and approve compensation for our executive officers which is intended to qualify as "performance based compensation" under Section 162(m) of the Internal Revenue Code. We expect this Subcommittee to be phased out in the future as a result of changes to the Internal Revenue Code that eliminated the concept of deductible "performance-based compensation" for our top executives.

Corporate Governance Principles

- We have adopted Corporate Governance Principles, including qualification and independence standards for directors.

Stock Ownership Guidelines

- We have adopted Stock Ownership Guidelines to align the interests of our executives and directors with the interests of stockholders and promote our commitment to sound corporate governance.
- The Stock Ownership Guidelines apply to the independent directors, the Chairman, the Chief Executive Officer, and all other officers with a rank of Vice President (in the executive compensation band) or higher.

Communication with Directors

- The Audit Committee has established a process for confidential and anonymous submission by our employees, as well as submissions by other interested parties, regarding questionable accounting or auditing matters.
- Additionally, the Board of Directors has established a process for stockholders to communicate with the Board of Directors, as a whole, or any independent director.

Codes of Business Conduct and Ethics

- We have adopted a Code of Ethical Conduct for Financial Managers, which applies to our Chief Executive Officer, Chief Operating Officer, Chief Financial Officer, Controller and other key financial managers. This code is filed as Exhibit 14 to this report.
- We also operate under a Code of Conduct that applies to all directors, officers and employees and includes provisions ranging from restrictions on gifts to conflicts of interests. All salaried employees are required to affirm annually their acceptance of, and compliance with, the Code of Conduct.

Related Party Transactions Policy

- We have adopted a Policy and Procedure for Transactions with Related Persons, under which our Audit Committee must generally pre-approve transactions involving more than $120,000 in any calendar year with our directors, executive officers, five percent or greater stockholders and their immediate family members.

Equity Award Policy

- We have adopted a written policy for all issuances by our company of compensatory awards in the form of our common stock or any derivative of our common stock.

Clawback Policy

- We have adopted a clawback policy under which we will, in specified circumstances, require reimbursement of annual and long-term incentives paid to an executive officer.

Personal Loans to Executive Officers and Directors

- We comply with and operate in a manner consistent with the legislation outlawing extensions of credit in the form of a personal loan to or for our directors or executive officers.

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 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. All such statements and reports can also be found at the internet site maintained by the SEC at *http://www.sec.gov* .

Our Audit Committee, Compensation/Nominating/Governance Committee and Executive Compensation Subcommittee 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.*

CONTRIBUTIONS OF MAJOR BUSINESSES

For information concerning our operating segments, geographic areas and major products or groups of products, see Note 11 to the consolidated financial statements of Tenneco Inc. included in Item 8. The following tables summarize for each of our reportable segments for the periods indicated: (i) net sales and operating revenues; (ii) earnings before interest expense, income taxes and noncontrolling interests (“EBIT”); and (iii) expenditures for plant, property and equipment. See also “Management’s Discussion and Analysis of Financial Condition and Results of Operations” included in Item 7 for information about certain costs and charges included in our results; and our current six operating segments (North America Clean Air, North America Ride Performance, Europe and South America Clean Air, Europe and South America Ride Performance, Asia Pacific Clean Air and Asia Pacific Ride Performance). Within each geographical area, each operating segment manufactures and distributes either clean air or ride performance products primarily for the original equipment and aftermarket industries. Each of the six operating segments constitutes a reportable segment. Costs related to other business activities, primarily corporate headquarters functions, are disclosed separately from the six operating segments as "Other". We evaluate segment performance based primarily on earnings before interest expense, income taxes, and noncontrolling interests. Products are transferred between segments and geographic areas on a basis intended to reflect as nearly as possible the "market value" of the products.

Net Sales and Operating Revenues:

	2017		2016		2015	
			(Dollar Amounts in Millions)			
Clean Air Division						
North America	$ 3,118	34 %	$ 3,016	35 %	$ 2,839	35 %
Europe and South America	2,253	24 %	2,031	24 %	1,892	23 %
Asia Pacific	1,211	13 %	1,130	13 %	1,080	13 %
Intergroup sales	(65)	(1)%	(108)	(1)%	(116)	(1)%
Total Clean Air Division	6,517	70 %	6,069	71 %	5,695	70 %
Ride Performance Division						
North America	1,235	13 %	1,243	14 %	1,323	16 %
Europe and South America	1,108	12 %	936	11 %	876	11 %
Asia Pacific	514	6 %	435	5 %	373	4 %
Intergroup sales	(100)	(1)%	(84)	(1)%	(86)	(1)%
Total Ride Performance Division	2,757	30 %	2,530	29 %	2,486	30 %
Total Tenneco Inc.	$ 9,274	100 %	$ 8,599	100 %	$ 8,181	100 %

EBIT:

	2017		2016		2015	
			(Dollar Amounts in Millions)			
Clean Air Division						
North America	$ 203	49 %	$ 220	43 %	$ 244	48 %
Europe and South America	112	27 %	98	19 %	49	10 %
Asia Pacific	133	31 %	150	29 %	114	22 %
Total Clean Air Division	448	107 %	468	91 %	407	80 %
Ride Performance Division						
North America	120	29 %	157	30 %	155	30 %
Europe and South America	21	5 %	16	3 %	(11)	(2)%
Asia Pacific	58	14 %	63	12 %	44	9 %
Total Ride Performance Division	199	48 %	236	45 %	188	37 %
Other	(230)	(55)%	(188)	(36)%	(87)	(17)%
Total Tenneco Inc.	$ 417	100 %	$ 516	100 %	$ 508	100 %

Expenditures for Plant, Property and Equipment:

	2017		2016		2015	
	(Dollar Amounts in Millions)					
Clean Air Division						
North America	$ 117	30%	$ 103	30%	$ 95	32%
Europe and South America	66	17%	74	22%	73	25%
Asia Pacific	41	11%	48	14%	44	15%
Total Clean Air Division	224	58%	225	66%	212	72%
Ride Performance Division						
North America	73	19%	55	16%	34	12%
Europe and South America	60	16%	46	13%	38	13%
Asia Pacific	28	7%	13	4%	10	3%
Total Ride Performance Division	161	42%	114	33%	82	28%
Other	—	—%	4	1%	1	—%
Total Tenneco Inc.	$ 385	100%	$ 343	100%	$ 295	100%

Interest expense, income taxes, and noncontrolling interests that were not allocated to our operating segments are:

	2017	2016	2015
		(Millions)	
Interest expense (net of interest capitalized)	$ 73	$ 92	$ 67
Income tax expense	70	—	146
Noncontrolling interests	67	68	54

DESCRIPTION OF OUR BUSINESS

We design, manufacture and sell clean air and ride performance systems and products for light vehicle, commercial truck, off-highway and other applications, and generated revenues of $9.3 billion in 2017. We serve both original equipment manufacturers (OEMs) and replacement markets worldwide through leading brands, including Monroe ®, Rancho ®, Clevite ® Elastomers, Axios ™, Kinetic ®, and Fric-Rot ™ ride performance products and Walker ®, XNOx ®, Fonos ™, DynoMax ® and Thrush ® clean air products.

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 most leading OEMs, commercial truck and off-highway engine manufacturers, and aftermarket distribution channels.

Overview of Parts Industry for Vehicles and Engines

The parts industry for vehicles and engines is generally separated into two categories: (1) "original equipment" or "OE" parts that are sold in large quantities directly for use by manufacturers of light vehicles, commercial trucks and off-highway engines; and (2) "aftermarket" or replacement parts that are sold in varying quantities to wholesalers, retailers and installers. In the OE category, parts suppliers are generally divided into tiers — "Tier 1" suppliers that provide their products directly to OEMs, and "Tier 2" or "Tier 3" suppliers that sell their products principally to other suppliers for combination into those other suppliers' own product offerings.

"Light vehicles" are comprised of: (1) passenger cars and (2) light trucks which include sport-utility vehicles (SUVs), crossover vehicles (CUVs), pick-up trucks, vans and multi-purpose passenger vehicles. Demand for OE light vehicle automotive parts is generally a function of the number of new vehicles produced, which in turn depends on prevailing economic conditions and consumer preferences. 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, by further expanding business with existing customers and by serving new customers in existing or new markets. Companies with a global presence and advanced technology, engineering, manufacturing and support capabilities, such as our company, are better positioned to take advantage of these opportunities.

Increasing vehicle emissions regulations are driving opportunities for increasing clean air content on vehicles and engines. Additionally, the increase and expansion in mandated diesel emission control and noise regulations or standards in North America, Europe, China, Japan, Brazil, Russia, India and South Korea have enabled suppliers such as us to serve customers beyond light vehicles. Certain parts suppliers that have traditionally supplied the automotive industry also develop and produce components and integrated systems for commercial truck, off-highway and other applications, such as medium- and heavy-duty trucks, buses, stationary engines, agricultural and construction equipment, locomotive and marine engines and recreational two-wheelers and all-terrain vehicles. We foresee this diversification of content and applications as a source of future growth.

Demand for aftermarket products is driven by general economic conditions, the number of vehicles in operation, the age and distance driven of the vehicle fleet, and the average useful life and quality of vehicle parts. Although more vehicles are on the road than ever before, the aftermarket has experienced longer replacement cycles due to the improved quality and increased average useful life of vehicle parts that has come to pass as a result of technological innovation. Parts suppliers are increasingly being required to deliver innovative aftermarket products to drive increased aftermarket demand. Global economic downturns generally impact aftermarket sales less adversely than OE sales, as customers forego new vehicle purchases and keep their vehicles longer, thereby increasing demand for repair and maintenance parts and services.

Industry Trends

As the dynamics of the customers we serve change, so do the roles, responsibilities and relationships of the participants. Key trends that we believe are affecting parts suppliers include:

General Economic Factors and Production Levels

Global light vehicle production has increased at a steady pace over the past three years, increasing 2% in 2015, 5% in 2016 and 2% in 2017. The overall rate of growth in 2017 was primarily driven by the 20% growth in South America and 4% growth in Europe, while partially offset by 4% decline in North America. IHS Markit projects global light vehicle production will grow 2% in 2018. Production of commercial trucks globally and off-highway equipment in regulated regions has recovered strongly in 2017. Global commercial trucks grew 13% in 2017, 3% in 2016 and declined 14% in 2015. Power Systems Research forecast these markets to be flat in 2018.

Electrification / Hybridization of the Light Vehicle Fleet

There is significant attention on electrification of the light vehicle fleet with both full battery electric vehicles and hybrid powertrains. Electrified vehicles are expected to grow from under 5% of the fleet today to around 34% by 2025, according to IHS Markit, with hybrids expected to make up almost 90% of the electrified fleet in 2025. The fast growing hybrid powertrains need to meet the increasingly stringent emissions standards and currently represent a content growth opportunity for Tenneco.

Autonomous Vehicle and Mobility Trends

Our Monroe® Intelligent Suspension advanced technologies are well-positioned for autonomous driving trends that we expect will require suspensions with “high speed rail” smoothness. Our in-development active suspension technologies tap into the seeing and sensing capabilities embedded in autonomous features to become predictive and isolate the cabin and its occupants from the road surface. In addition, shared mobility trends and the resulting greater vehicle utilization drive wear and tear on the vehicles, increasing the need for replacement parts.

Aftermarket Opportunities in New Markets

Tenneco has strong aftermarket positions in North America, Europe and South America. We expect there to be aftermarket growth opportunities in areas such as China and India, and are investing to position ourselves as a leading aftermarket supplier in these regions. For example, the China car parc is expected to age and grow significantly over the next decade. By 2025, we expect the China aftermarket will be the largest in the world. 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.

Increasing Environmental Standards

OE manufacturers and their parts suppliers are designing and developing products to respond to increasingly stringent environmental requirements, growth in engines using diesel and alternative fuels, and increased demand for better fuel economy. Government regulations require substantial reductions in vehicle tailpipe criteria pollutant emissions and longer warranty periods for a vehicle’s pollution control equipment. The products that our clean air division provides reduce the tailpipe emissions of criteria pollutants. In addition, regulations have been adopted to regulate greenhouse gas emissions of carbon dioxide. Reducing CO_2 emissions requires improving fuel economy; as a result improved combustion efficiency and reduction of vehicle mass have become priorities. Manufacturers are responding to all of these regulations with new technologies for gasoline- and diesel-fueled vehicles that minimize pollution and improve fuel economy.

As a leading supplier of clean air systems with strong technical capabilities, we are well positioned to benefit from the more rigorous environmental standards being adopted around the world. 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.

To meet stricter air quality regulations, we have developed and sold diesel particulate filters (DPFs) in Europe, for example, for the Audi A4, BMW 1 series passenger cars and Scania trucks and in North America for GM Duramax engine applications, the Ford Super Duty, the Chrysler Ram Heavy Duty, and off-highway applications for Caterpillar and John Deere in North America and Europe, and Kubota in Japan. These particulate filters, coupled with converters, reduce emissions of particulate matter by up to 90 percent. In addition, we have development and production contracts for our selective catalytic reduction (SCR) systems with light and commercial vehicle manufacturers. These SCR systems reduce emissions of nitrogen oxides by up to 95 percent. In China, South America, Europe, and Japan, we have development and production contracts for complete turnkey SCR systems that include the urea dosing technology acquired in 2007 and now sold globally under the name XNOx®. Regulations in the U.S. and European markets, which require reductions in carbon dioxide emissions and improvements in fuel economy, are creating increased demand for our fabricated manifolds, maniverters, integrated turbocharger/manifold modules, electronic exhaust valves, and lightweight components. Lastly, for various off-highway customers, we offer emission aftertreatment systems designed to meet environmental regulations or their equivalent outside of the U.S. Both commercial truck and off-highway customers are embracing the concept of turnkey aftertreatment systems which require aftertreatment electronic control units (ECUs) as well as related control software which we have developed and sold to several customers.

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, spending $158 million in 2017, $154 million in 2016, and $146 million in 2015, net of customer reimbursements. Such expenses reimbursed by our customers totaled $164 million in 2017, $137 million in 2016, and $145 million in 2015, including building prototypes and incurring other costs on behalf of our customers. We also fund and sponsor university and other independent research to advance our clean air and ride performance development efforts.

By investing in technology, we have been able to expand our product offerings and penetrate new markets. For example, we developed DPFs which were first sold in Europe and then offered in North America. Since these original innovations, we have developed T.R.U.E-Clean® systems with our partners, a product used to regenerate DPFs. We have also built prototypes of urea

SCR systems for locomotive and marine engines. We expanded our suite of NOx-reduction technologies, developing prototypes of SCR systems using gaseous ammonia, absorbed on a solid salt, as the reductant or a hydrocarbon lean NOx catalyst (HC-LNC for NOx reduction) that relies on hydrocarbons, ethanol, or other reductants instead of urea. We successfully developed and sold fabricated manifolds, previously used only on gasoline engines, into the passenger car diesel segment. We developed our prototype aftertreatment system for large engines, up to 4500 horsepower, used in line haul locomotives. On the ride performance side of our business, we co-developed with Öhlins Racing AB a continuously controlled electronic suspension system offered by OEMs such as Volvo, Audi, Ford, VW, Mercedes Benz and BMW.

Enhanced Vehicle Safety and Handling

To serve the needs of their customers and meet government mandates, OEMs are seeking parts suppliers that invest in new technologies, capabilities and products that advance vehicle safety, such as roll-over protection systems, computerized electronic suspension, and safer, more durable materials. Those suppliers able to offer such innovative products and technologies have a distinct competitive advantage.

Tenneco offers adjustable and adaptive damping as well as semi-active suspension systems designed to improve vehicle stability, handling, safety and control. Our systems are based on various technologies including DRiV ™ digital valve, Continuously Variable Semi-Active (CVSA) damping and Kinetic ® roll control, and Actively Controlled Car (ACOCAR ™). In the aftermarket, we supply premium Monroe ® branded brakes that complement our ride performance offerings. In addition, we continue to promote the Safety Triangle ™ of Steering-Stopping-Stability to educate consumers about the detrimental effect of worn shock absorbers on vehicle steering and stopping distances.

Outsourcing and Demand for Systems and Modules

OEMs 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.

Modules and systems being produced by parts suppliers are described as follows:

- "Modules" are groups of component parts arranged in close physical proximity to each other within a vehicle. Modules are often assembled by the supplier and shipped to the OEM for installation in a vehicle as a unit. Integrated shock and spring units, seats, instrument panels, axles and door panels are examples.
- "Systems" are groups of component parts located throughout a vehicle which operate together to provide a specific vehicle functionality. Emission control systems, anti-lock braking systems, safety restraint systems, roll control systems and powertrain systems are examples.

This shift towards fully integrated modules and systems created the role of the Tier 1 systems integrator, a supplier responsible for executing a broad array of activities, including design, development, engineering, and testing of component parts, modules and systems. As an established Tier 1 supplier, we have produced modules and systems for various vehicle platforms produced worldwide, including supplying ride performance modules for the Chevrolet Silverado, GMC Sierra, Chevrolet Malibu, Chevrolet Impala and Chevrolet Cruze and emission control systems for the Chevrolet Colorado, GMC Canyon, Ford Super Duty, Ford Focus, Chevrolet Silverado, GMC Sierra, Chevrolet Malibu, Opel Astra, and VW Golf. In addition, we continue to design other modules and systems for platforms yet to be introduced to the global marketplace.

Global Reach of OE Customers

Changing market dynamics are driving OEMs and their parts suppliers to expand their global reach:

- *Growing Importance of Growth Markets:* Because the North American and Western European automotive regions are mature, OEMs are increasingly focusing on other markets for growth opportunities, such as India and China. As OEMs have penetrated new regions, growth opportunities for suppliers have emerged.
- *Governmental Tariffs and Local Parts Requirements:* Many governments around the world require vehicles sold within their country to contain specified percentages of locally produced parts. Additionally, some governments place high tariffs on imported parts.
- *Location of Production Closer to End Markets:* As OEMs and parts suppliers have shifted production globally to be closer to their end markets, suppliers have expanded their reach, capturing sales in other markets and taking advantage where possible of relatively low labor costs.
- *Global Rationalization of OE Vehicle Platforms* (described below).

Because of these trends, OEMs are increasingly seeking suppliers capable of supporting vehicle platforms on a global basis. They want suppliers like Tenneco with design, production, engineering and logistics capabilities that can be accessed not just in North America and Europe but also in many other regions of the world.

Global Rationalization of OE Vehicle Platforms

OEMs have standardized on global platforms designing basic mechanical structures that are suitable for a number of similar vehicle models and able to accommodate different features for more than one region. This standardization will drive production of light vehicles designed on global platforms to grow. Accordingly, light vehicle platforms whose annual production exceed one million units are expected to grow from 57 percent of global OE production in 2017 to 61 percent in 2022 based on data provided by IHS Automotive.

With such global platforms, OEMs realize significant economies of scale by limiting variations in items such as steering columns, brake systems, transmissions, axles, exhaust systems, support structures and power window and door lock mechanisms. The shift towards standardization can also benefit parts suppliers. They can experience greater economies of scale, lower material costs, and reduced development costs.

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, although there are more vehicles on the road than ever before, the global aftermarket has not kept pace with that growth. Accordingly, aftermarket suppliers have focused on reducing costs and providing product differentiation through advanced technology and recognized brand names. With our long history of technological innovation, strong brands and operational effectiveness, we believe we are well positioned to leverage our products and technology.

Changing Aftermarket Distribution Channels and Increased Competition from Lower cost, Private-Label Products

From 2003 to 2017, the number of traditional jobber stores declined in the U.S. Major aftermarket retailers, such as AutoZone and Advance Auto Parts, have continued their work to expand their retail outlets and commercial distribution strategies to sell directly and more effectively to parts installers, which historically had purchased the majority of their needs from local warehouse distributors and jobbers. The size and number of consolidations as well as key customer distribution center footprint expansions have increased in the last few years, including Advance Auto Parts' purchase of Carquest (which included WorldPac), AutoZone's purchase of Interamerican Motor Company, O'Reilly Auto Parts' purchase of V.I.P., and more recently Bond Auto, to expand their entrance into the Northeast U.S. market, and Icahn Enterprises L.P.'s agreement to acquire Pep Boys and AutoPlus. We are well positioned to respond to these trends and feel our strategy and portfolio of customers are in line with the market changes and opportunities. We make and sell high-quality products marketed under premium brands that appeal to aftermarket retailers and the customers they serve. In addition, our breadth of suspension and emissions control products and a reputation for customer service provide benefits to both wholesalers and retailers.

More recently, our aftermarket business is facing increasing competition from 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.

Analysis of Revenues

The table below provides, for each of the years 2015 through 2017, information relating to our net sales and operating revenues, by primary product lines and customer categories.

	Net Sales Year Ended December 31,		
	2017	2016	2015
		(Millions)	
Clean Air Products & Systems			
Aftermarket	$ 301	$ 305	$ 318
Original Equipment			
OE Value-add	4,029	3,736	3,489
OE Substrate(1)	2,187	2,028	1,888
	6,216	5,764	5,377
	6,517	6,069	5,695
Ride Performance Products & Systems			
Aftermarket	950	937	941
Original Equipment	1,807	1,593	1,545
	2,757	2,530	2,486
Total Revenues	$ 9,274	$ 8,599	$ 8,181

(1) See "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in Item 7 for a discussion of substrate sales.

Brands

We have two of the most recognized brands in the industry: Monroe ® used for ride control products and Walker ® for exhaust products. We differentiate our products and their value proposition with our brands:

- Monroe ® , Kinetic ® , Fric-Rot ™ , Gas-Matic ® , Sensa-Trac ® , OESpectrum ® , and Quick-Strut ® for ride performance products,
- Walker ® , Fonos ™ , XNOx ® , Mega-Flow ® , Quiet-Flow ® , and Tru-Fit ® for clean air products,
- DynoMax ® and Thrush ® for performance clean air products,
- Rancho ® for suspension products for high performance light trucks, and
- Clevite ® Elastomers and Axios ™ for noise, vibration and harshness (NVH) control components.

Customers

We strive to develop long-standing business relationships with our customers around the world. In each of our operating segments, 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.

In 2017, we served more than 80 different OEMs and commercial truck and off-highway engine manufacturers worldwide, and our products were included on six of the top 10 passenger car models produced for sale in Europe and nine of the top 10 light truck models produced for sale in North America for 2017.

During 2017, our OE customers included the following manufacturers of light vehicles, commercial trucks and off-highway equipment and engines:

North America	**Europe**	**Asia**
AM General	Agco Corp	Austem
BMW	AvtoVAZ	Beijing Automotive
Caterpillar	BMW	BMW
CNH Industrial	Caterpillar	Brilliance Automobile
Daimler AG	CNH Industrial (Iveco)	CAMC
FCA	Daimler AG	Chang'an Automotive
Ford Motor	Deutz AG	China National Heavy-Duty Truck Group
General Motors	Ford Motor	Daimler AG
Harley-Davidson	Geely Automobile	Dongfeng Motor
Honda Motors	General Motors	FCA
Hyundai Motor	John Deere	First Auto Works
John Deere	Mazda Motor	Ford Motor
Navistar International	McLaren Automotive	Geely Automobile
Renault/Nissan	Paccar	General Motors
Paccar	PSA Peugeot Citroen	Great Wall Motor
Toyota Motor	Renault/Nissan	Isuzu Motor Company
Volkswagen Group	Suzuki Motor	Jiangling Motors
Volvo Global Truck	Tata Motors	JND
	Toyota Motor	Kubota
	Volkswagen Group	Renault/Nissan
	Volvo Global Truck	SAIC Motor
		Tata Motors
		Toyota Motor
		Weichai Power
		Yuchai Group

Australia	South America	India
General Motors	CNH Industrial (Iveco)	Ashok Leyland
Toyota Motor	Daimler AG	BMW
	FCA	Daimler AG
	Ford Motor	Ford Motor
	General Motors	General Motors
	John Deere	John Deere
	PSA Peugeot Citroen	Mahindra & Mahindra
	Randon S.A.	Renault/Nissan
	Renault/Nissan	Suzuki Motor
	Toyota Motor	Tata Motors
	Volkswagen Group	Toyota Motor
		Volkswagen Group

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

Customer	2017	2016	2015
General Motors Company	14%	17%	15%
Ford Motor Company	13%	13%	14%

During 2017, our aftermarket customers were comprised of full-line and specialty warehouse distributors, retailers, jobbers, installer chains and car dealers. These customers included National Auto Parts Association (NAPA)/Alliance, Advance Auto Parts, O'Reilly Auto Parts, and AutoZone in North America; Auto Teile Ring, Autodistribution International, Nexus Automotive International, Temot Autoteile GmbH, and Group Auto Union in Europe; and Rede Presidente in South America. We believe our aftermarket revenue mix is balanced, with our top 10 aftermarket customers accounting for 65 percent of our net aftermarket sales and our aftermarket sales representing 14 percent of our total net sales in 2017.

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. For OE sales, we believe that we rank among the top two suppliers for certain key clean air and ride performance products and systems in many regions of the world. In the aftermarket, we believe that we are a leader in supplying clean air and ride performance products for light vehicles for the key applications we serve throughout the world.

Seasonality

Our OE and aftermarket 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 generally. Our aftermarket operations, also affected by seasonality, 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. During periods of economic recession, OE sales traditionally decline due to reduced consumer demand for automobiles and other capital goods. Aftermarket sales tend not to be as adversely affected during periods of economic downturn, as consumers forego new vehicle purchases and keep their vehicles longer, thereby increasing demand for repair and maintenance services. By participating in both the OE and aftermarket segments, we generally see a smaller revenue decline during economic downturns than the overall change in OE production.

Clean Air Systems

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.

We design, manufacture and distribute a variety of products and systems designed to reduce pollution and optimize engine performance, acoustic tuning and weight, including the following:

- 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;
- Selective Catalytic Reduction (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; and
- 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 system 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 OEM'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.

We supply our clean air offerings to approximately 25 light vehicle manufacturers, including five of the top 10 passenger car models produced in Europe and eight of the top 10 light truck models produced in North America for 2017. We also supply clean air products to approximately 30 manufacturers of commercial trucks, off-highway equipment and engines, and other vehicles including BMW Motorcycle, Caterpillar, CNHTC, Daimler Trucks, Deutz, FAW Truck, Ford, Harley-Davidson, John Deere, Kubota, Scania and Weichai Power.

We acquired our original clean air product line in 1967 with the acquisition of Walker Manufacturing Company, which was founded in 1888, and became one of Europe's leading OE clean air systems suppliers with the acquisition of Heinrich Gillet

GmbH & Co. in 1994. Throughout this document, the term “Walker” refers to our subsidiaries and affiliates that produce clean air products and systems.

In the aftermarket, we manufacture, market and distribute replacement mufflers for virtually all North American, European, and Asian light vehicle models under brand names including Quiet-Flow ® and Tru-Fit ® in addition to offering a variety of other related products such as pipes and catalytic converters (Walker ® Perfection). We also serve the specialty exhaust aftermarket with offerings that include Mega-Flow ® exhaust products for heavy-duty vehicle applications and DynoMax ® high performance exhaust products. We continue to emphasize product-value differentiation with other aftermarket brands such as Walker ® , Thrush ® and Fonos ™ .

Ride Performance Systems

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.

We design, manufacture and distribute a variety of ride performance products and systems including:

- Shock absorbers — A broad range of mechanical shock absorbers and related components for light- and heavy-duty vehicles, including twin-tube and monotube shock absorbers;
- Struts — A complete line of struts and strut assemblies for light vehicles;
- Vibration control components (Clevite ® Elastomers, Axios ™) — 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;
- Monroe ® Intelligent Suspension Portfolio:
    - 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;
    - Semi-active and active suspension systems — Shock absorbers and suspension systems such as CVSAe and ACOCAR ™ that electronically adjust a vehicle’s performance based on certain inputs such as steering and braking; and
    - Kinetic H2/CVSA Continuously Variable Semi Active suspension system (Formerly known as CES) — In 2011, we won the Supplier of the Year award from *Vehicle Dynamics International* magazine, which recognizes outstanding achievement in global automotive suspension and chassis engineering, for the Kinetic H2/CVSA Continuously Variable Semi Active suspension system installed on the McLaren MP4-12C; and
- Other — We also offer other ride performance products such as load assist products, springs, steering stabilizers, adjustable suspension systems, suspension kits and modular assemblies.

We supply our ride performance offerings to approximately 25 light vehicle manufacturers, including five of the top 10 passenger car models produced in Europe and eight of the top 10 light truck models produced in North America for 2017. We also supply ride performance products and systems to approximately 40 manufacturers of commercial truck, off-highway and other vehicles including Caterpillar, Daimler Trucks, John Deere, Navistar, Paccar, Scania and Volvo Truck.

In the ride performance aftermarket, we manufacture, market and distribute replacement shock absorbers for virtually all North American, European and Asian light vehicle models under several brand names including Gas-Matic ® , Sensa-Trac ® , Monroe ® Reflex ® and Monroe ® Adventure ™ , Quick-Strut ® , as well as Clevite ® Elastomers and Axios ™ for elastomeric vibration control components. We also sell ride performance offerings for commercial truck and other aftermarket segments, such as our Gas-Magnum ® shock absorbers for the North American commercial category.

We entered the ride performance product line in 1977 with the acquisition of Monroe Auto Equipment Company, which was founded in 1916 and which introduced the world’s first modern tubular shock absorber in 1930. When the term “Monroe” is used in this document it refers to our subsidiaries and affiliates that produce ride performance products and systems.

Financial Information About Geographic Areas

Refer to Note 11 of the consolidated financial statements of Tenneco Inc. included in Item 8 of this report for financial information about geographic areas.

Sales, Marketing and Distribution

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

For OE sales, our sales and marketing team is an integrated group of professionals, including skilled engineers and program managers, who are organized by customer and product type (e.g., ride performance and clean air). Our sales and marketing teams are centered on meeting the customer's needs with 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 OEMs. Our business capture process involves working closely with the OEM 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, and assisting with developing component/system specifications and test procedures. Given that the OE business involves 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.

For aftermarket sales and marketing, our sales force is generally organized by customer and region and covers multiple product lines. We sell aftermarket products through four primary channels of distribution: (1) the traditional three-step distribution system of full-line warehouse distributors, jobbers and installers; (2) the specialty two-step distribution system of specialty warehouse distributors that carry only specified automotive product groups and installers; (3) direct sales to retailers; and (4) direct sales to installer chains. 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 from end-users, we run print, online and outdoor advertisements and offer pricing promotions. We offer business-to-business services to customers with TA-Direct, an on-line order entry and customer service tool. In addition, we maintain detailed web sites for each of our Walker®, Monroe®, Rancho®, DynoMax®, and Monroe® brake brands and our heavy-duty products.

Manufacturing and Engineering

We focus on achieving superior product quality at the lowest delivered cost possible using productive, reliable and safe manufacturing processes to achieve that goal. Our manufacturing strategy is a component of our Tenneco Business System (TBS) which is a holistic approach to how we work that creates standardized processes and gives us a common business language across business units and geographies. By driving speed and predictability, the Tenneco Business System enables us to accelerate growth, achieve cost leadership and create high-performance teams. Manufacturing Operations is one of the value streams that comprise the Tenneco Business System. It is focused on optimizing operations across all Tenneco manufacturing facilities to drive predictable performance and become the global benchmark. Within the Manufacturing Operations value stream, there are nine principles: health and safety; environmental management; continuous improvement; design for manufacturing; total quality management; material control; visual management; total productive maintenance; and high performance teams. Our goal is to have zero accidents, zero problems with deliveries, zero quality issues, and zero waste. When we eliminate these issues, we will deliver better service to our customers because we'll have better quality and better cost. We'll have a safer environment for our employees, and we'll become more predictable. We deploy new technology to differentiate our products from our competitors’ and to achieve higher quality and productivity. We continue to adapt our capacity to customer demand, both expanding capabilities in growth areas as well as reallocating capacity away from segments in decline.

Clean Air

We operate 64 clean air manufacturing facilities worldwide, of which 16 facilities are located in North America, 21 in Europe and South America, and 27 in Asia Pacific. We operate 17 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, two joint ventures in which we hold a noncontrolling interest operate a total of two manufacturing facilities in Europe.

Our clean air manufacturing operations are organized by core competency: final assembly welding, muffler manufacturing, catalytic converter canning, pipe bending, pipe making and stamping. All sites are deploying a focused factory operating model around these competencies, promoting efficient production and material management in a safe environment. Effective sharing of best business practices and engaged employees enable us to rapidly improve manufacturing operations to best in class. To continuously drive improvement we deployed and operate within the Tenneco Business System, which focuses on execution of

Tenneco requirements in seven specific areas (total quality management, total productive maintenance, continuous improvement, visual factory, safety, environmental, and materials management).

We continue to invest in equipment, infrastructure and new processes to remain competitive, serve our customers and deliver industry cost leadership. Our industry leading global clean air manufacturing footprint employs a strategy of final assembly JIT (just in time) manufacturing sites close to our customers and centres of excellence for component manufacturing. Most recently manufacturing has continued to develop laser welding for various products including mixer production, introduced precision assembly for acoustic valves and increased levels of automation across all core competencies.

To strengthen our position as a Tier 1 OE systems supplier, we have developed some of our clean air manufacturing operations into “just-in-time” or “JIT” systems. In this system, a JIT facility located close to our OE customer’s manufacturing plant receives product components from both our manufacturing operations and independent suppliers, and then assembles and ships products to the OEMs on an as-needed basis. To manage the JIT functions and material flow, we have advanced computerized material requirements planning systems linked with our customers’ and supplier partners’ resource management systems. We have 25 clean air JIT assembly facilities worldwide, of which four facilities are located in North America, nine in Europe, and 12 in Asia Pacific.

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 to the OEMs, supplying complete emission control systems from the manifold to the tailpipe, to provide full emission and noise control. We expanded our engineering capabilities with acquisitions in 2007 and 2012 of Combustion Component Associates’ technology for use in mobile emission and stationary engine applications, respectively. That technology, with its urea and hydrocarbon injectors, electronic controls and software, is marketed and sold globally under the XNOx ® name for use in selective catalytic reduction (SCR) and other exhaust aftertreatment systems. We also offer a complete suite of alternative full system NOx aftertreatment technologies, including the Hydrocarbon Lean NOx Catalyst (HC-LNC) technology under joint development with General Electric, and Solid SCR ™ technology licensed from Amminex, an engineering and manufacturing company located in Denmark. We also developed advanced predictive engineering tools, including KBM&E (Knowledge Based Manufacturing & Engineering). The innovation of our KBM&E (which we call TEN-KBM&E) is a modular toolbox set of CAD embedded applications for manufacturing and engineering compliant design. The encapsulated TEN-KBM&E content is driven by an analytical method which continuously captures and updates the knowledge of our main manufacturing and engineering processes. Our global engineering capabilities are standardized through the use of the ATLAS Global PDM (Product Data Management) system, enabling a more efficient transfer of knowledge around the world.

Ride Performance

We operate 28 ride performance manufacturing facilities worldwide, of which nine facilities are located in North America, ten in Europe and South America, and nine 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, four in Europe and South America, and one 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.

To strengthen our position as a Tier 1 OE module supplier, we have developed four of our ride performance manufacturing facilities into JIT assembly facilities located in Europe and India.

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.

Conventional shock absorbers and struts generally develop an appropriate compromise between ride comfort and handling. Our innovative gas-charged shock absorbers and struts provide both ride comfort and vehicle control, resulting in improved handling, reduced vibration and a wider range of vehicle control. This technology can be found in our premium quality OESpectrum ® shock absorbers. We further enhanced this technology by adding the SafeTech ™ fluon banded piston, which improves shock absorber performance and durability. We introduced the Monroe ® Reflex ® shock absorber, which incorporates our

Impact Sensor ™ device. This technology permits the shock absorber to automatically switch in a matter of milliseconds between firm and soft compression damping when the vehicle encounters rough road conditions, and thus maintaining better tire-to-road contact and improving handling and safety. We developed the Quick-Strut ® which simplifies and shortens the installation of aftermarket struts. This technology combines the spring and upper mount into a single, complete module, eliminating the need for special tools and skills required previously. We have also developed an innovative computerized electronic suspension system, which features dampers developed by Tenneco and electronic valves designed by Öhlins Racing AB. The Continuously Variable Semi Active ("CVSA") electronic suspension ride performance system is featured on Audi, Volvo, Ford, Volkswagen, BMW, and Mercedes Benz vehicles. To help make electronic suspension more affordable to a wider range of vehicles, we are designing an innovative, electronically-controlled DRiV™ suspension system that features hydraulic valve technology we purchased in 2014 from Sturman Industries.

Quality Management

Tenneco's Quality Management System is an important part of product and process development and validation. Design engineers establish performance and reliability standards in the product's design stage, and use prototypes to confirm that the component/system can be manufactured to specifications. Quality Management is also integrated into the launch and manufacturing process, with team members at every stage of the work-in-process, ensuring finished goods are being fabricated to meet customers' requirements.

The Quality Management System is detailed in Tenneco's Global Quality Manual. The Global Quality Manual complies with the IATF 16949:2016 and ISO 9001:2015 specifications, and customers' specific requirements. We continue to implement and monitor all new and proposed required standards in advance of their due date. All of Tenneco's manufacturing facilities, where it has been determined that certification is necessary to serve the customer, or would provide an advantage in securing additional business, have successfully achieved the applicable standard's requirements. Additionally, each employee is expected to follow the relevant standards, policies, and procedures contained in the Global Quality Manual.

Global Procurement Management

Our direct and indirect material costs represent a significant component of our cost structure. To ensure that our material acquisition process provides both a local and global competitive advantage, in addition to meeting regional legislative requirements, we have designed globally integrated standard processes which are managed by global teams of commodity specialists. Each global commodity strategy is tailored to regional requirements while leveraging our global scale to deliver the most cost effective solutions at a local level.

Business Strategy

We strive to strengthen our global market position by designing, manufacturing, delivering and marketing technologically innovative clean air and ride performance products and systems for OEMs and the aftermarket. We work toward achieving a balanced mix of products, markets and customers by capitalizing on emerging trends, specific regional preferences and changing customer requirements. We target both mature and developing markets for light vehicles, commercial trucks, off-highway engines and other vehicle or engine applications. We further enhance our operations by focusing on operational excellence in all functional areas.

The key components of our business strategy are described below:

Develop and Commercialize Advanced Technologies

We develop and commercialize technologies that allow us to expand into new, fast-growing market segments and serve our existing customers. By anticipating customer needs and preferences, we design advanced technologies that meet global market needs. For example, to help our customers meet the increasingly stringent emissions regulations being introduced around the world, we offer several technologies designed to reduce NOx emissions from passenger, commercial truck and off-highway vehicles. These technologies include an integrated Selective Catalytic Reduction (SCR) system that incorporates our XNOx ® technology, electrical valves for diesel-powered vehicles with low-pressure exhaust gas recirculation systems, and diesel and gasoline particulate filters. We also offer a NOx absorber and a hydrocarbon lean NOx catalyst system, thermal management solutions, such as our T.R.U.E.-Clean ® active diesel particulate filter system and, through a consortium, thermoelectric generators that convert waste exhaust heat into electrical energy.

We expect demand for our products to continue to rise over the next several years. Advanced aftertreatment exhaust systems are required to comply with emissions regulations that affect light, commercial truck and off-highway vehicles as well as locomotive, marine and stationary engines. In addition, vehicle manufacturers are offering greater comfort, handling and safety features with products such as electronic suspension and adjustable dampers. Our CVSA electronic suspension dampers, which we co-developed with Öhlins Racing AB, are now sold to Volvo, Audi, Mercedes, VW, BMW, and Ford, among others, and our Clevite ® engineered elastomers to manufacturers with unique NVH requirements. Our newest electronic suspension product

DRiV ™ is the first industry example of multiple digital valves coupled with smart switching for use in ride performance products that results in faster response, lighter weight, and reduced power consumption compared to existing analog products.

We continue to focus on introducing highly engineered systems and complex assemblies and modules that provide value-added solutions to our customers and increase our content on vehicles. Having many of our engineering and manufacturing facilities integrated electronically, we believe, has helped our products continue to be selected for inclusion in top-selling vehicles. In addition, our just-in-time and in-line sequencing manufacturing processes and distribution capabilities have enabled us to be more responsive to our customers' needs.

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 clean air and ride performance 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 truck and off-highway 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 engineer and build modular NOx-reduction systems for large engines that meet standards of the International Maritime Organization, among others. In 2015, we received three Product Design Assessment (PDA) certificates from the American Bureau of Shipping, one of the world's leading ship-classification societies, and two Approved-In-Principle (AIP) certificates from DNV GL, another leading global classification society and recognized advisor of the maritime industry.

Our revenues generated by our commercial truck, off-highway and other business sectors were 12 percent of our total annual OE revenues in 2017 and 11 percent in 2016.

Expand and Adjust Manufacturing Footprint and Engineering Capabilities

We continue to expand and adjust our global footprint to serve OE and aftermarket customers, building our capabilities to engineer and produce cost competitive, cutting-edge products around the world. In 2015, we opened new facilities in Jeffersonville, Indiana, Sanand, India, Stanowice, Poland and Suzhou, China. We also expanded our manufacturing operations in Celaya, Mexico that produce dampers and other ride performance products for light vehicles and commercial trucks and in Tredegar, U.K. to support growth on significant incremental new business. In addition, we built out our engineering capabilities in Poland, as well as the expansion of our testing capabilities in Germany. In 2016, we opened new facilities in Spring Hill, Tennessee and Lansing, Michigan to support our customers' growth. We also expanded our manufacturing operations in Puebla, Mexico and Birmingham, UK to support growth on significant incremental business. In addition, we built out our testing capabilities in Zwickau, Germany. In 2017, we continued expanding our operations in Puebla as well as expanded capacity in Cangzhou, China. We also expanded production in our Poland plant to meet increasing demand for our Aftermarket ride control products.

Besides expanding our manufacturing footprint and engineering capabilities to serve new customers or markets, we are re-aligning our production, supply chain and other operational functions to ensure standardization, remove redundancies, reduce transit costs, leverage economies of scale, and optimize manufacturing productivity. Adjusting to customer volumes we closed our assembly plant in St. Petersburg, Russia in 2016. In June 2017, we announced the closing of our Clean Air manufacturing plant in O'Sullivan Beach, Australia when General Motors and Toyota end vehicle production in the country, which occurred in October 2017.

Maintain Our Aftermarket Leadership

We manufacture, market and sell leading, brand-name products to a diversified and global aftermarket customer base. Two of the most recognized brand-name products in the automotive parts industry are our Monroe ® ride performance products and Walker ® clean air products, which have been offered to consumers since the 1930s. We believe our brand equity in the aftermarket is a key asset especially as customers consolidate and distribution channels converge.

We provide value differentiation by creating product extensions bearing our various brands. For example, we offer Monroe ® Reflex ® and Monroe ® OESpectrum ® dampers, Walker ® Quiet-Flow ® mufflers, Rancho ® ride performance products, DynoMax ® exhaust products and Walker Ultra ® catalytic converters, and in Europe, Walker and Aluminox Pro ™ mufflers. Further, we market Monroe ® Springs, Monroe ® Steering and Suspension, and Monro-Magnum ® (bus and truck shock line) in Europe and continue to grow our Monroe ® Brake pads in North America. We continue to explore other opportunities for developing new product lines that will be marketed under our existing, well-known brands.

We strive to gain additional market share in the aftermarket business by adding new product offerings and increasing our market coverage of existing brands and products. For one, we offer an innovative ride performance product, the Quick-Strut ® , that combines the dampers, spring and upper mount into a single, complete module that simplifies and shortens the installation process, eliminating the need for the special tools and skills required previously. Additionally, we find ways to benefit from the consolidation of, and the regional expansion by, our customers and gain business from our competitors given our strength and understanding in the markets and channels in which we do business.

Our success in the aftermarket strengthens our competitive position with OEMs, and vice versa. We gain timely market and product knowledge that can be used to modify and enhance our offerings for greater customer acceptance. We also can readily introduce aftermarket products by leveraging our experience in the OE market. An example of such is our suite of manifold converters and diesel particulate filters which were first sold in the OE market and then tailored for the aftermarket.

Execute Focused Transactions

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 have a licensing agreement for T.R.U.E.-Clean ®, an exhaust aftertreatment technology used for automatic and active regeneration of Diesel Particulate Filters (DPFs), with Woodward Governor Company. This is an example of a technology which complements our array of existing clean air products, allowing us to provide integrated exhaust aftertreatment systems to commercial truck, off-highway and other vehicle manufacturers.

In July 2015, we announced our intention to discontinue our Marzocchi motorcycle fork suspension product line and our mountain bike suspension product line, and liquidate our Marzocchi operations. In November 2015, we closed on the sale of certain assets related to our Marzocchi mountain bike suspension product line to the affiliates of Fox Factory Holding Corp.; and in December 2015, we closed on the sale of the Marzocchi motorcycle fork product line to an Italian company, VRM S.p.A.

In March 2016, we completed the disposition of the Gijon, Spain plant and signed an agreement to transfer ownership of the manufacturing facility in Gijon to German private equity fund Quantum Capital Partners A.G. (QCP). The transfer to QCP was effective March 31, 2016 and under a three year manufacturing agreement, QCP will also continue as a supplier to Tenneco.

In April 2017, we sold our 49% equity interest in the Futaba-Tenneco U.K. joint venture entity which produces stamped metal parts to our partner in that joint venture, Futaba Industrial Co., Ltd.

We intend to continue to pursue strategic alliances, joint ventures, acquisitions and other transactions that complement 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.

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. For example, on January 31, 2013, we announced our intent to reduce structural costs in Europe by approximately $60 million annually. With the disposition of the Gijon, Spain plant, which was completed at the end of the first quarter of 2016, the annualized rate essentially reached our target of $55 million, at the current exchange rates. In November 2015, we closed on the sale of certain assets related to our Marzocchi mountain bike suspension product line to the affiliates of Fox Factory Holding Corp.; and in December 2015, we closed on the sale of the Marzocchi motorcycle fork product line to an Italian company, VRM S.p.A. These actions were a part of our ongoing efforts to optimize our Ride Performance product line globally while continuously improving our operations and increasing profitability. In June 2017, we announced the closing of our Clean Air manufacturing plant in O'Sullivan Beach, Australia when General Motors and Toyota end vehicle production in the country, which occurred in October 2017. All such restructuring activities related to this initiative are expected to be completed by the first quarter of 2018.

Strengthen Operational Excellence

We will continue to focus on operational excellence by optimizing our manufacturing footprint, enhancing our Six Sigma processes and Lean productivity tools, developing further 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. We will be mindful of the changing market conditions that might necessitate adjustments to our resources and manufacturing capacity around the world. We will remain committed to protecting the environment as well as the health and safety of our employees.

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 — Liquidity and Capital Resources” and Note 12 of the consolidated financial statements included in Item 8.

Employees

As of December 31, 2017 , we had approximately 32,000 employees of whom approximately 44 percent were covered by collective bargaining agreements. European works councils cover 15 percent of our total employees, a majority of whom are also included under collective bargaining agreements. Several of our existing labor agreements covering plants in Mexico, Argentina, Brazil, Europe, India and Thailand are expiring in 2018. We regard our employee relations as satisfactory.

Other

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 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. We manufacture and distribute our aftermarket products primarily under the Walker ® and Monroe ® brand names, which are well-recognized in the marketplace and 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.

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 OEM 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 truck production has declined significantly in South America in 2015 and 2016 and persistent challenges in the Chinese economy going into 2018 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 the United States 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 restructurings 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 automotive, commercial truck and off-highway 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; 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.

We are dependent on large customers for future revenue. The loss of all or a substantial portion of our sales to 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 net sales. For example, during the fiscal year ended December 31, 2017 , GM and Ford accounted for 14 percent and 13 percent of our net sales, respectively. The loss of all or a substantial portion of our sales to 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 make fewer sales to these customers for a variety of reasons, including but not limited to: (1) loss of awarded business; (2) reduced or delayed customer requirements; (3) strikes or other work stoppages affecting production by the customers; or (4) reduced demand for our customers' products.

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

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 U.S., 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 going into 2018 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.

Our level of debt 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 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, 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 incurring additional indebtedness, making investments, granting liens, selling assets and merging or consolidating with other companies.

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 receivables securitization program in the U.S. require us to maintain certain financial ratios. Our senior credit facility and our other debt instruments require us to comply with various operational and other covenants. If there were an event of default under any of our debt instruments that was not cured or waived, the holders of the defaulted debt could cause all amounts outstanding with respect to that debt 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 securitization program. We cannot assure you that our assets or cash flow would be sufficient to fully repay borrowings under our outstanding debt 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 debt 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 are 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 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 our business strategy of improving operating performance and generating 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, such as the significant production decreases we experienced during 2008 and 2009 as a result of the global economic crisis, and the lingering effects this crisis had in Europe in particular. 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 industries 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 Chrysler 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, such as the 2008 strike at American Axle which resulted in 30 GM facilities in North America being idled for several months, 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, during 2017, carbon steel prices as well as raw material prices (such as ferrochrome, iron ore, scrap and coking coal) to produce carbon steel and stainless steel remained at high levels after the sharp increases in 2016. In addition, both the European Union as well as the 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.

With Tenneco 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.

We are subject to extensive government 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.

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, that 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.

We may have difficulty competing favorably in the highly competitive automotive parts industry.

The 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.

Furthermore, due to the cost focus of our major 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 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 customers and necessary to win additional business. 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 automotive parts customers and suppliers 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 automotive parts is decreasing in both the original equipment market and aftermarket. As a result, we are competing for business from fewer customers. Furthermore, consolidation and bankruptcies among automotive parts 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.

Longer product lives of 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. 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 would further adversely affect the demand for our aftermarket products. Aftermarket sales represented approximately 13 percent, 14 percent and 15 percent of our net sales in the fiscal years ended December 31, 2017 , December 31, 2016 and December 31, 2015 , respectively.

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, particularly in China, 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 and countries, including Australia, Asia, North America, Europe, South Africa and South America, and sell our products worldwide. For the fiscal year ended December 31, 2017 , approximately 53 percent 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 unrest, including any resultant 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;
- controls on the repatriation of cash, including imposition or increase of withholding and other taxes on remittances and other payments by foreign subsidiaries;
- export and import restrictions and an unfavorable trade environment, including as a result of political conditions and changes in the laws in the United States and elsewhere; and
- requirements for manufacturers to use locally produced goods.

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.

Impairment in the carrying value of long-lived assets and goodwill could negatively affect our operating results.

We have a significant amount of long-lived assets and goodwill on our consolidated balance sheet. Under generally accepted accounting principles, long-lived assets are required to be reviewed 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 must be evaluated for impairment annually or more frequently if events indicate it is warranted. If the carrying value of our reporting units exceeds their current fair value as determined based on discounted future cash flows of the related business, the goodwill is considered impaired. As a result, a goodwill impairment loss would be measured at the amount by which a reporting unit’s carrying amount exceeds its fair value, not to exceed the carrying amount of goodwill. Events and conditions that could result in impairment in the value of our long-lived assets and goodwill include changes in the industries in which we operate, particularly the impact of a downturn in the global economy, as well as competition and advances in technology, adverse changes in the regulatory environment, or other factors leading to reduction in expected long-term sales or profitability. We recorded an $11 million non-cash goodwill impairment charge related to Europe and South America Ride Performance reporting unit in the fiscal year ended December 31, 2017 and did not record any non-cash asset impairment charges during the fiscal years ended December 31, 2016 or 2015.

The value of our deferred tax assets could become impaired, which could materially and adversely affect our operating results.

As of December 31, 2017 , we had approximately $193 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.

We have identified a material weakness in our internal control over financial reporting which could, if not remediated, result in material misstatements in our financial statements.

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rule 13a-15(f) under the Securities Exchange Act of 1934, as amended. As disclosed in Part II, Item 9A, management identified a material weakness in internal control over financial reporting related to the accounting for payments received by the Company from suppliers by certain purchasing and accounting personnel at the Company's China subsidiaries. A material weakness (as defined in Rule 12b-2) is a deficiency, or combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of annual or interim financial statements will not be prevented or detected on a timely basis. As a result of this material weakness, management concluded that internal control over financial reporting was not effective based on criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in "Internal Control-An Integrated Framework (2013)." This material weakness resulted in a revision to our consolidated financial statements as of December 31, 2016, 2015 and 2014, each quarterly and year-to-date periods in those respective years, and the first quarterly period in 2017. We have designed, and are implementing, a remediation plan to address this material weakness. If remedial measures are insufficient to address the material weakness, or if additional material weaknesses in internal control are discovered or occur in the future, our consolidated financial statements may contain material misstatements and we could be required to restate our financial results.

ITEM 1B. UNRESOLVED STAFF COMMENTS.

None.

ITEM 2. PROPERTIES.

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

Our Clean Air product line operates 64 manufacturing facilities worldwide, of which 16 facilities are located in North America, 21 in Europe and South America, and 27 in Asia Pacific. Clean Air also operates five engineering and technical facilities worldwide and shares three other such facilities with Ride Performance. Twenty-five of these manufacturing plants are JIT facilities. In addition, two joint ventures in which we hold a noncontrolling interest operate a total of two manufacturing facilities in Europe, all of which are JIT facilities.

Our Ride Performance product line operates 28 manufacturing facilities worldwide, of which nine facilities are located in North America, ten in Europe and South America, and nine in Asia Pacific. Ride Performance also operates seven engineering and technical facilities worldwide and shares three other such facilities with Clean Air. Four of these manufacturing plants are JIT facilities located in Europe and India.

The above-described manufacturing locations are located in Argentina, Australia, Belgium, Brazil, Canada, China, Czech Republic, France, Germany, Hungary, India, Italy, Japan, Mexico, Poland, Portugal, Russia, Spain, South Africa, South Korea, Sweden, Thailand, the United Kingdom and the United States. We also have a sales office located in Singapore.

We own 48 and lease 64 of the properties described above. We hold 19 of the above-described international manufacturing facilities through eight joint ventures in which we own a controlling interest. In addition, two joint ventures in which we hold a noncontrolling interest operate a total of two manufacturing facilities in Europe. We also have distribution facilities at our manufacturing sites and at a few off-site locations, substantially all of which we lease.

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 have generally satisfactory title to the properties owned and used in our respective businesses.

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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 United States 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 expense or capitalize, as appropriate, expenditures for ongoing compliance with environmental regulations that relate to current operations. We expense costs related to an existing condition caused by past operations that do not contribute to current or future revenue generation. As of December 31, 2017 , we have the obligation to remediate or contribute towards the remediation of certain sites, including one Federal Superfund site. At December 31, 2017 , our aggregated estimated share of environmental remediation costs for all these sites on a discounted basis was approximately $14 million, of which $2 million is recorded in other current liabilities and $12 million is recorded in deferred credits and other liabilities in our consolidated balance sheet. For those locations where the liability was discounted, the weighted average discount rate used was 2.3 percent. The undiscounted value of the estimated remediation costs was $17 million. Our expected payments of environmental remediation costs are estimated to be approximately $2 million in 2018, $1 million each year beginning 2019 through 2022 and $11 million in aggregate thereafter.

Based on information known to us, 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 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 in excess of our share of remediation costs. Our understanding of the financial strength of other potentially responsible parties 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 potentially responsible party in the Federal Superfund site, or as a liable party at the other locations referenced herein, will be material to our consolidated financial position, results of operations, or liquidity.

Antitrust Investigations and Litigation

On March 25, 2014, representatives of the European Commission 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 March 25, 2014, we also received a related subpoena from the U.S. Department of Justice ("DOJ").

On November 5, 2014, the DOJ granted us conditional leniency pursuant to an agreement we entered into under the Antitrust Division's Corporate Leniency Policy. This agreement provides us with important benefits 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 us, nor seek any criminal fines or penalties, in connection with the matters we reported to the DOJ. Additionally, there are limits on our liability related to any follow-on civil antitrust litigation in the U.S. 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 our satisfying the DOJ and any court presiding over such follow-on civil litigation.

On April 27, 2017, Tenneco received notification from the European Commission (EC) that it has administratively closed its global antitrust inquiry regarding the production, assembly, and supply of complete exhaust systems. No charges against Tenneco 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 our company. We have cooperated and continue to cooperate fully with all of these antitrust investigations, and take other actions to minimize our potential exposure.

Tenneco and certain of its competitors are also currently defendants in civil putative class action litigation 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 we received conditional leniency from the DOJ, our civil liability in the U.S. follow-on actions 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 exposure for U.S. follow-on actions.

Following the EC's decision to administratively close its antitrust inquiry into exhaust systems in 2017, Tenneco's receipt of conditional leniency from the DOJ in 2014 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 Tenneco and/or certain of its competitors in the U.S., Tenneco 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, Tenneco settled an administrative action brought by Brazil's competition authority for an amount that was not material. Additionally, in February 2018, Tenneco 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 Tenneco in the United States. Based upon those earlier developments, including settlement discussions, Tenneco 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 Tenneco's antitrust matters globally, which primarily involves the resolution of civil suits and related claims. Of the $132 million reserve that was established, $45 million was paid in 2017 to resolve certain antitrust claims and the remaining reserve is recorded in other current liabilities. While Tenneco continues to cooperate with certain competition agencies investigating possible violations of antitrust laws relating to products supplied by Tenneco, 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 Tenneco can make a reasonable estimate of the costs to resolve such outstanding matters. Tenneco'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 the control of Tenneco. As a result, Tenneco'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, 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.

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 nationwide. A small number of claims have been asserted against one of our subsidiaries by railroad workers alleging exposure to asbestos products in railroad cars. The substantial majority of the remaining claims are related to alleged exposure to asbestos in our automotive products although a significant number of those claims appear also to involve occupational exposures sustained in industries other than automotive. We believe, based on scientific and other evidence, it is unlikely that 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. 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 future consolidated financial position, results of operations or liquidity.

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. For example, in July 2017 a complaint was filed against us in federal district court in Chicago, Illinois alleging that we misappropriated a third party's trade secrets in connection with certain of our ride control products.

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" and in this paragraph we do not expect the legal proceedings, claims or investigations currently pending against us will have any material adverse impact on our consolidated financial position, results of operations or liquidity. With respect to the trade secret claim described above, we are in the process of evaluating the claim but, at this stage of the case and given the inherent uncertainly of litigation, we are unable to estimate whether a loss is reasonably possible. While we do not believe that this litigation will have a material adverse effect on our annual consolidated financial position, results of operations or liquidity, we cannot assure you that this will be the case.

ITEM 4. MINE SAFETY DISCLOSURES.

Not applicable.

ITEM 4.1. EXECUTIVE OFFICERS OF THE REGISTRANT.

The following provides information concerning the persons who serve as our executive officers as of February 28, 2018.

Name and Age	Offices Held
Gregg M. Sherrill (65)	Executive Chairman
Brian J. Kesseler (51)	Chief Executive Officer
Kenneth R. Trammell (57)	Executive Vice President and Chief Financial Officer
Peng (Patrick) Guo (52)	Executive Vice President and President Clean Air
Martin Hendricks (55)	Executive Vice President and President Ride Performance
Jason M. Hollar (44)	Senior Vice President Finance
Gregg Bolt (58)	Senior Vice President Global Human Resources and Administration
Brandon B. Smith (37)	Senior Vice President, General Counsel and Corporate Secretary
Paul D. Novas (59)	Vice President Finance and Interim Controller
Ben P. Patel (50)	Vice President and Chief Technology Officer

Gregg M. Sherrill — Mr. Sherrill became our Executive Chairman in May 2017. Mr. Sherrill was named the Chairman and Chief Executive Officer of Tenneco in January 2007. Mr. Sherrill joined us from Johnson Controls Inc., where he served since 1998, most recently as President, Power Solutions. From 2002 to 2003, Mr. Sherrill served as the Vice President and Managing Director of Europe, South Africa and South America for Johnson Controls' Automotive Systems Group. Prior to joining Johnson Controls, Mr. Sherrill held various engineering and manufacturing assignments over a 22-year span at Ford Motor Company, including Plant Manager of Ford's Dearborn, Michigan engine plant, Chief Engineer, Steering Systems and Director of Supplier Technical Assistance. Mr. Sherrill became a director of our company in January 2007.

Brian J. Kesseler - Mr. Kesseler was named Chief Executive Officer in May 2017. 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.

Kenneth R. Trammell — Mr. Trammell has served as our Chief Financial Officer since September 2003. Mr. Trammell was a Senior Vice President from September 2003 until January 2006 when he became an Executive Vice President. He was our Vice President and Controller from September 1999 to September 2003 and Corporate Controller of Tenneco Inc. from April 1997 to November 1999. He joined Tenneco Inc. in May 1996 as Assistant Controller. Before joining Tenneco Inc., Mr. Trammell spent 12 years with the international public accounting firm of Arthur Andersen LLP, last serving as a senior manager.

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 Ashai 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.

Martin Hendricks — Mr. Hendricks was named Executive Vice President and President Ride Performance in February 2017. Mr. Hendricks joined Tenneco from Federal Mogul Corp. where he had been since May 2008, serving most recently as president, global braking and regional president, EMEA, based in Glinde, Germany. During his time at Federal Mogul, Mr. Hendricks served in management and executive roles in both OE and aftermarket businesses and in the EMEA, North America and South America regions. His previous experience includes leadership positions with EurotaxGlass International AG, TRW and Robert Bosch. Mr. Hendricks has more than 25 years of experience with an extensive background in optimizing operations, driving sales and market share growth, integrating businesses and expanding in new markets.

Jason M. Hollar — Mr. Hollar joined Tenneco as Senior Vice President Finance in June 2017. 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.

Gregg Bolt — Mr. Bolt was named our Senior Vice President Global Human Resources and Administration in February 2013. 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.

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.

Paul D. Novas — Mr. Novas was named Vice President Finance and Interim Controller in October 2017. Previously he served as Vice President Finance for Tenneco since March 2015. He also served as Vice President and Controller since July 2006. Mr. Novas served as Vice President, Finance and Administration for Tenneco Europe from January 2004 until July 2006 and as Vice President and Treasurer of Tenneco from November 1999 until January 2004. Mr. Novas joined Tenneco in 1996 as Assistant Treasurer responsible for corporate finance and North American treasury operations. Prior to joining Tenneco, Mr. Novas worked in the treasurer's office of General Motors Corporation for 10 years.

Ben P. Patel — Dr. Patel was named Vice President and Chief Technology officer in March 2017. Previously, 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.

PART II

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

Our outstanding shares of common stock, par value $.01 per share, are listed on the New York and Chicago Stock Exchanges. The following table sets forth, for the periods indicated, the high and low sales prices of our common stock on the New York Stock Exchange Composite Transactions Tape.

	Sales Prices	
Quarter	High	Low
2017		
1st	$ 70.96	$ 60.27
2nd	64.50	53.40
3rd	61.27	51.54
4th	65.44	52.40
2016		
1st	$ 52.16	$ 34.45
2nd	57.73	44.55
3rd	58.97	44.68
4th	66.98	51.09

As of February 23, 2018 , there were approximately 14,260 holders of record of our common stock, including brokers and other nominees.

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 initial dividend was payable on March 23, 2017 to stockholders of record as of March 7, 2017. In 2017, we paid a dividend of $0.25 per share each quarter, for an annual dividend of $1.00 per share, or $53 million. The Company did not pay any dividends in fiscal years 2016 or 2015. While we currently expect to pay comparable quarterly cash dividends in the 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.

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.

See "Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters" included in Item 12 for information regarding securities authorized for issuance under our equity compensation plans.

Purchase of equity securities by the issuer and affiliated purchasers

The following table provides information relating to our purchase of shares of our common stock in the fourth quarter of 2017 . 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 2017	518,558	$ 62.29	518,507	$ 237
November 2017	1,032	$ 57.99	—	$ 237
December 2017	108,000	$ 57.51	108,000	$ 231
Total	627,590	$ 61.46	626,507	$ 231

(1) Includes shares withheld upon vesting of restricted stock in the amount of 51 in October 2017 and 1,032 in November 2017.

In October 2015, our Board of Directors expanded our company's share repurchase program, authorizing the repurchase of an additional $200 million of our company's outstanding common stock. This authorization was in addition to the $350 million share repurchase program our company announced in January 2015.

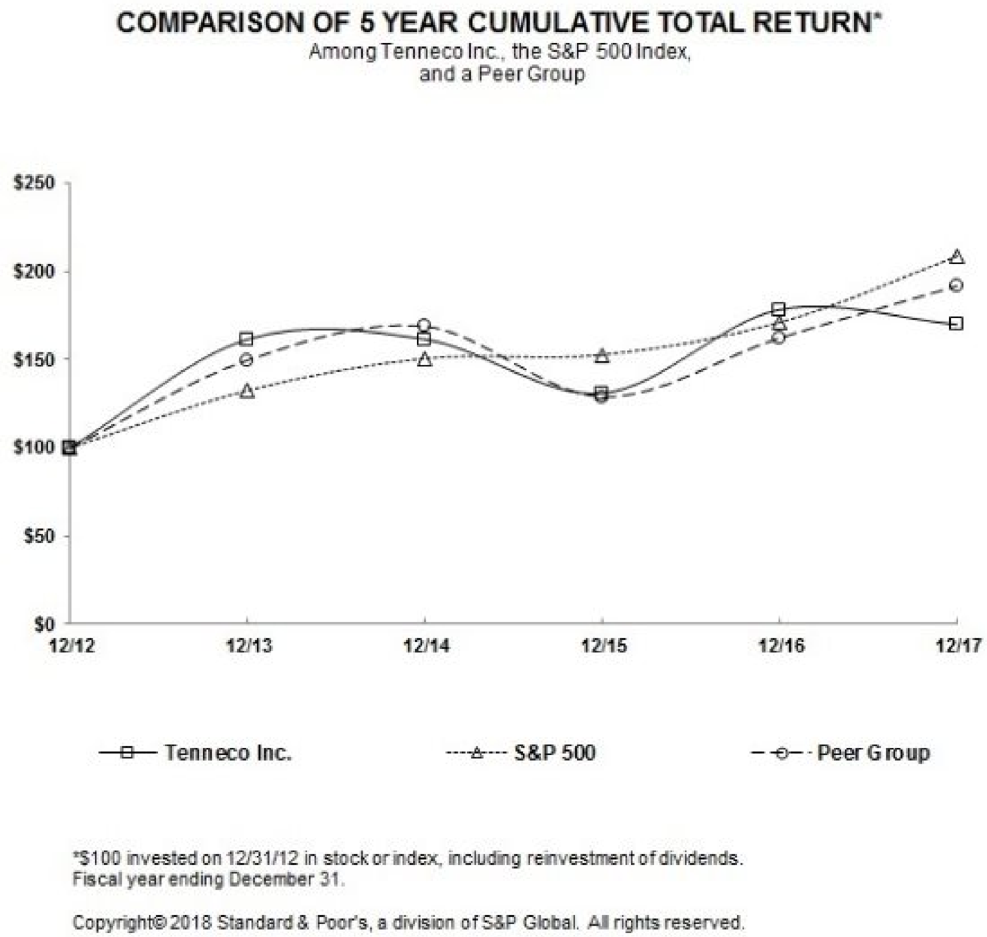
In February 2017, our Board of Directors authorized the repurchase of up to $400 million of the Company's outstanding common stock over the next three years. This includes the remaining amount authorized under earlier repurchase programs. The Company anticipates acquiring the shares through open market or privately negotiated transactions, which will be funded through cash from operations. The repurchase program does not obligate the Company to make repurchase within any specific time or situations, and opportunities in higher priority areas could affect the cadence of this program.

Recent Sales of Unregistered Securities

None.

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 Inc., Lear Corp., Magna International Inc., and Meritor, Inc. These comparisons assume an initial investment of $100 and the reinvestment of dividends.



	12/31/2012	12/31/2013	12/31/2014	12/31/2015	12/31/2016	12/31/2017
Tenneco Inc.	100.00	161.12	161.24	130.76	177.93	169.58
S&P 500	100.00	132.39	150.51	152.59	170.84	208.14
Peer Group	100.00	149.59	168.85	128.99	162.25	191.66

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.

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.

We are organized and manage our business along our two major product lines (clean air and ride performance) and three geographic areas (North America; Europe and South America; Asia Pacific), resulting in six operating segments (North America Clean Air, North America Ride Performance, Europe and South America Clean Air, Europe and South America Ride Performance, Asia Pacific Clean Air and Asia Pacific Ride Performance). Within each geographical area, each operating segment manufactures and distributes either clean air or ride performance products primarily for the original equipment and aftermarket industries. Each of the six operating segments constitutes a reportable segment. Costs related to other business activities, primarily corporate headquarter functions, are disclosed separately from the six operating segments as "Other."

TENNECO INC. AND CONSOLIDATED SUBSIDIARIES
SELECTED CONSOLIDATED FINANCIAL DATA

	Year Ended December 31,				
	2017(a)	2016(b)	2015(c)	2014(d)	2013(e) (k)
	(Millions Except Share and Per Share Amounts)				
Statements of Income Data:					
Net sales and operating revenues —					
Clean Air Division					
North America	$ 3,118	$ 3,016	$ 2,839	$ 2,801	$ 2,626
Europe and South America	2,253	2,031	1,892	2,044	1,993
Asia Pacific	1,211	1,130	1,080	1,066	904
Intergroup sales	(65)	(108)	(116)	(139)	(119)
Total Clean Air Division	6,517	6,069	5,695	5,772	5,404
Ride Performance Division					
North America	1,235	1,243	1,323	1,361	1,265
Europe and South America	1,108	936	876	979	997
Asia Pacific	514	435	373	363	344
Intergroup sales	(100)	(84)	(86)	(94)	(86)
Total Ride Performance Division	2,757	2,530	2,486	2,609	2,520
Total Tenneco Inc.	$ 9,274	$ 8,599	$ 8,181	$ 8,381	$ 7,924
Earnings before interest expense, income taxes, and noncontrolling interests —					
Clean Air Division					
North America	$ 203	$ 220	$ 244	$ 237	$ 229
Europe and South America	112	98	49	57	59
Asia Pacific	133	150	114	101	80
Total Clean Air Division	448	468	407	395	368
Ride Performance Division					
North America	120	157	155	143	124
Europe and South America	21	16	(11)	37	(7)
Asia Pacific	58	63	44	38	22
Total Ride Performance Division	199	236	188	218	139
Other	(230)	(188)	(87)	(124)	(85)
Total Tenneco Inc.	$ 417	$ 516	$ 508	$ 489	$ 422
Interest expense (net of interest capitalized)	73	92	67	91	80
Income tax expense	70	—	146	131	122
Net income	274	424	295	267	220
Less: Net income attributable to noncontrolling interests	67	68	54	42	38
Net income attributable to Tenneco Inc.	$ 207	$ 356	$ 241	$ 225	$ 182
Weighted average shares of common stock outstanding —					
Basic	52,796,184	55,939,135	59,678,309	60,734,022	60,474,492
Diluted	53,026,911	56,407,436	60,193,150	61,782,508	61,594,062
Basic earnings per share of common stock	$ 3.93	$ 6.36	$ 4.05	$ 3.70	$ 3.02
Diluted earnings per share of common stock	$ 3.91	$ 6.31	$ 4.01	$ 3.64	$ 2.96
Cash dividends declared	$ 1.00	$ —	$ —	$ —	$ —

	Years Ended December 31,				
	2017	2016	2015	2014	2013
	(Millions Except Ratio and Percent Amounts)				
Balance Sheet Data (at year end):					
Total assets(f)	$ 4,842	$ 4,346	$ 3,970	$ 3,996	$ 3,817
Short-term debt	83	90	86	60	83
Long-term debt(f)	1,358	1,294	1,124	1,055	1,006
Redeemable noncontrolling interests	42	40	41	34	20
Total Tenneco Inc. shareholders' equity	696	573	425	495	432
Noncontrolling interests	46	47	39	40	39
Total equity	742	620	464	535	471
Statement of Cash Flows Data:					
Net cash provided by operating activities (g)	$ 629	$ 484	$ 528	$ 379	$ 533
Net cash used by investing activities	(413)	(340)	(303)	(339)	(266)
Net cash provided (used) by financing activities (g)	(251)	(86)	(183)	(18)	(205)
Cash payments for plant, property and equipment	(394)	(325)	(286)	(328)	(244)
Other Data:					
EBITDA including noncontrolling interests(h)	$ 641	$ 728	$ 711	$ 697	$ 627
Ratio of EBITDA including noncontrolling interests to interest expense	8.78	7.91	10.61	7.66	7.84
Ratio of net debt (total debt less cash and cash equivalents) to EBITDA including noncontrolling interests(i)	1.75	1.42	1.30	1.19	1.29
Ratio of earnings to fixed charges(j)	4.26	4.55	5.73	4.38	4.32

NOTE: Our consolidated financial statements for the three years ended December 31, 2017 , which are discussed in the following notes, are included in this Form 10-K under Item 8.

(a) 2017 includes $72 million in restructuring and related costs primarily related to closing a Clean Air Belgian JIT plant in response to the end of production on a customer platform, closing an OE Clean Air manufacturing plant and downsizing Ride Performance operations in Australia, the required relocation of our Beijing Ride Performance plant outside of the Beijing area and other cost improvement initiatives. Of the $72 million we incurred in restructuring and related costs, $3 million was related to asset write-downs. 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. This amount is subject to change as we refine our earnings and profits calculations and as additional guidance is published. The Company will continue to refine its estimates throughout the measurement period provided for in SEC Staff Accounting Bulletin 118, or until its accounting is complete. 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.

(b) 2016 includes $36 million in restructuring and related costs primarily related to manufacturing footprint improvements in North America Ride Performance, headcount reduction and cost improvement initiatives in Europe and China Clean Air, South America and Australia. Of the total $36 million we incurred in restructuring and related costs, $6 million was related to asset write-downs. 2016 also includes a net tax benefit of $110 million primarily relating to the recognition of a U.S. tax benefit for foreign taxes, $24 million in pre-tax interest charges related to the refinancing of our senior notes due in 2020 and $72 million in pension buyout charges.

(c) 2015 includes $63 million of restructuring and related costs primarily related to the European cost reduction efforts, exiting the Marzocchi suspension business, headcount reductions in Australia and South America, and the closure of a JIT plant in Australia. Of the total $63 million we incurred in restructuring and related costs, $10 million was related to asset write-downs and $4 million was in charges related to pension benefits.

(d) 2014 includes $49 million of restructuring and related costs primarily related to the European cost reduction efforts, headcount reductions in Australia and South America, the sale of a closed facility in Cozad, Nebraska and costs related to organizational changes. Of the total $49 million we incurred in restructuring and related costs, $3 million was related to non-cash asset write downs and $2 million was related to a non-cash charge on the sale of a closed facility.

2014 also includes $32 million in charges related to postretirement benefits, of which $21 million was a non-cash charge related to payments made to retirement plan participants out of pension assets and $11 million related to an adjustment to the postretirement medical liability, and $13 million in pre-tax interest charges related to the refinancing of our senior credit facility.

(e) 2013 includes $78 million of restructuring and related costs primarily related to European cost reduction efforts including the planned closing of the ride performance plant in Gijon, Spain and intended reductions to the workforce at our ride performance plant in Sint-Truiden, our exit from the distribution of aftermarket exhaust products and ending production of leaf springs in Australia, headcount reductions in various regions, and the net impact of freezing our defined benefit plans in the United Kingdom. Of the total $78 million we incurred in restructuring and related costs, $3 million was related to non-cash asset write downs.

(f) In April 2015, the FASB issued Accounting Standard Update 2015-03, Simplifying the Presentation of Debt Issuance Costs, which requires debt issuance costs to be presented in the balance sheet as a direct deduction from the associated debt liability. For public business entities, the standard is effective for financial statements issued for fiscal years beginning after December 15, 2015, and interim periods within those fiscal years. Early adoption of the amendments in this update is permitted for financial statements that have not been previously issued. We adopted this standard for the first quarter of 2015 and applied retrospectively. The balance for unamortized debt issuance costs was $13 million at both December 31, 2017 and 2016, $12 million at December 31, 2015, $14 million at December 31, 2014 and $13 million at December 31, 2013 .

(g) In March 2016, the FASB issued Accounting Standard Update 2016-09, Compensation - Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting, as part of its initiative to reduce complexity in accounting standards. The areas for simplification in this update involve several aspects of the accounting for employee share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, and classification on the statement of cash flows. For public business entities, the standard is effective for financial statements issued for annual periods beginning after December 15, 2016, and interim periods within those annual periods. We adopted this standard for the first quarter of 2017 and applied prospectively with the exception of the cash flow statements according to the guidance. Note 1 to the consolidated financial statements of Tenneco Inc. located in Part II Item 8 — Financial Statements and Supplemental Data is incorporated herein by reference.

(h) EBITDA including noncontrolling interests is a non-GAAP measure defined as net income before extraordinary items, cumulative effect of changes in accounting principle, interest expense, income taxes, depreciation and amortization and noncontrolling interests. We use EBITDA including noncontrolling interests, together with GAAP measures, to evaluate and compare our operating performance on a consistent basis between time periods and with other companies that compete in our markets but which may have different capital structures and tax positions, which can have an impact on the comparability of interest expense, noncontrolling interests and tax expense. We also believe that using this measure allows us to understand and compare operating performance both with and without depreciation expense. We believe EBITDA including noncontrolling interests is useful to our investors and other parties for these same reasons.

EBITDA including noncontrolling interests should not be used as a substitute for net income or for net cash provided by operating activities prepared in accordance with GAAP. It should also be noted that EBITDA including noncontrolling interests may not be comparable to similarly titled measures used by other companies and, furthermore, that it excludes expenditures for debt financing, taxes and future capital requirements that are essential to our ongoing business operations. For these reasons, EBITDA including noncontrolling interests is of value to management and investors only as a supplement to, and not in lieu of, GAAP results. EBITDA including noncontrolling interests are derived from the statements of income (loss) as follows:

	Year Ended December 31,				
	2017	2016	2015	2014	2013
			(Millions)		
Net income	$ 207	$ 356	$ 241	$ 225	$ 182
Noncontrolling interests	67	68	54	42	38
Income tax expense	70	—	146	131	122
Interest expense, net of interest capitalized	73	92	67	91	80
Depreciation and amortization of other intangibles	224	212	203	208	205
Total EBITDA including noncontrolling interests	$ 641	$ 728	$ 711	$ 697	$ 627

(i) We present the ratio of net debt (total debt less cash and cash equivalents) to EBITDA including noncontrolling interests because management believes it is a useful measure of Tenneco's credit position and progress toward reducing leverage. The calculation is limited in that we may not always be able to use cash to repay debt on a dollar-for-dollar basis. Net debt balances are derived from the balance sheets as follows:

	Year Ended December 31,				
	2017	2016	2015	2014	2013
	(Millions)				
Total Debt	$ 1,441	$ 1,384	$ 1,210	$ 1,115	$ 1,089
Total Cash	318	349	288	285	280
Net Debt	$ 1,123	$ 1,035	$ 922	$ 830	$ 809

(j) For purposes of computing this ratio, earnings generally consist of income before income taxes and fixed charges excluding capitalized interest. Fixed charges consist of interest expense, the portion of rental expense considered representative of the interest factor and capitalized interest. See Exhibit 12 to this Form 10-K for the calculation of this ratio.

(k) Financial statements for 2013 have been revised to reflect the change in reportable segments that was announced in the first quarter of 2017.

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

As you read the following review of our financial condition and results of operations, you should also read our consolidated financial statements and related notes in Item 8.

Executive Summary

We are one of the world's leading manufacturers of clean air and ride performance products and systems for light vehicle, commercial truck and off-highway applications. We serve both original equipment (OE) vehicle designers and manufacturers and the repair and replacement markets, or aftermarket, globally through leading brands, including Monroe ® , Rancho ® , Clevite ® Elastomers, Axios ™ , Kinetic ® and Fric-Rot ™ ride performance products and Walker ® , XNOx ® , Fonos ™ , DynoMax ® and Thrush ® clean air products. We serve more than 80 different original equipment manufacturers and commercial truck and off-highway engine manufacturers, and our products are included on six of the top 10 car models produced for sale in Europe and nine of the top 10 light truck models produced for sale in North America for 2017. Our aftermarket customers are comprised of full-line and specialty warehouse distributors, retailers, jobbers, installer chains and car dealers. As of December 31, 2017 , we operated 92 manufacturing facilities worldwide and employed approximately 32,000 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 2017, light vehicle production continued to improve from recent years in some of the geographic regions in which we operate. Light vehicle production was up three percent in Europe, 20 percent in South America, two percent in China and seven percent in India. North America light vehicle production was down four percent.

As announced on February 7, 2017, we made an organizational change in our reportable segments effective with the first quarter of 2017. Our Clean Air and Ride Performance product lines in India, which had been reported as part of the Europe, South America and India segments, are now reported with their respective product lines in the Asia Pacific segments. Prior period segment information has been revised to reflect our new reporting segments.

Total revenue for 2017 was $9,274 million, up eight percent from $8,599 million in 2016, on strong global light vehicle and commercial truck, off-highway and other vehicle revenues, driven by both the Clean Air and Ride Performance product lines. Excluding the impact of currency and substrate sales, revenue was up $447 million from $6,571 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, mainly in North America and Europe. Higher aftermarket Ride Performance revenues in Europe, South America and Asia Pacific were offset by lower aftermarket revenues in Clean Air and North America Ride Performance.

Cost of sales: Cost of sales for 2017 was $7,812 million, or 84.2 percent of sales, compared to $7,123 million, or 82.8 percent of sales in 2016. The following table lists the primary drivers behind the change in cost of sales ($ millions).

Year ended December 31, 2016	$	7,123
Volume and mix		550
Material		35
Currency exchange rates		75
Restructuring		19
Other costs		10
Year ended December 31, 2017	$	7,812

The increase in cost of sales was 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.

Gross margin: Revenue less cost of sales for 2017 was $1,462 million, or 15.8 percent of sales, versus $1,476 million, or 17.2 percent of sales in 2016. The effect on gross margin resulting from year-over-year increase in volume and favorable currency impact was more than offset by higher net material costs, higher restructuring costs and higher other costs, mainly manufacturing.

Engineering, research and development: Engineering, research and development expense was $158 million and $154 million in 2017 and 2016, respectively.

Selling, general and administrative (SG&A): Selling, general and administrative expense was up $59 million in 2017, at $648 million, compared to $589 million in 2016. 2017 included a $132 million antitrust settlement accrual and 2016 included $72 million in pension buyout charges.

Depreciation and amortization: Depreciation and amortization expense was $224 million and $212 million for 2017 and 2016, respectively.

Goodwill impairment: As a result of our goodwill impairment evaluation in the fourth quarter of 2017, we determined that the estimated fair value of the Europe and South America Ride Performance reporting unit was lower than its carrying value. Accordingly, we recorded a goodwill impairment charge of $11 million in the fourth quarter. We reached this determination based on updated long-term projections for the Europe and South America Ride Performance reporting unit provided by the Company's annual budgeting and strategic planning process, which is completed in the fourth quarter. The 2017 annual budgeting and strategic planning process indicated that the reporting unit's recovery period will be longer than previously expected.

Earnings before interest expense, taxes and noncontrolling interests ("EBIT") was $417 million for 2017, a decrease of $99 million, when compared to $516 million in the prior year. Higher OE light vehicle and commercial truck, off-highway and other vehicle revenues in all regions, higher aftermarket Ride Performance revenues in Europe, South America and Asia Pacific, as well as new platforms, mainly in North America and Europe, were more than offset by lower aftermarket revenues in Clean Air and North America Ride Performance, higher manufacturing costs, higher restructuring and related costs, the antitrust settlement accrual of $132 million, a goodwill impairment charge of $11 million in Europe and South America, a warranty settlement with a customer, the timing of steel economics recoveries and continued investments in growth for new programs. EBIT for 2016 also included $72 million in pension buyout charges.

Results from Operations

Net Sales and Operating Revenues for Years 2017 and 2016

The tables below reflect our revenues for 2017 and 2016. We show the component of our OE revenue represented by substrate sales. While we generally have primary design, engineering and manufacturing responsibility for OE emission control systems, we do not manufacture substrates. Substrates are porous ceramic filters coated with a catalyst - typically, precious metals such as platinum, palladium and rhodium. These 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. As the need for more sophisticated emission control solutions increases to meet more stringent environmental regulations, and as we capture more diesel aftertreatment business, these substrate components have been increasing as a percentage of our revenue. 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 original equipment customers generally assume the risk of precious metals pricing volatility, it impacts our reported revenues. Presenting revenues that exclude "substrates" used in catalytic converters and diesel particulate filters removes this impact.

Additionally, 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 2016 table since this is the base period for measuring the effects of currency during 2017 on our operations. We believe investors find this information useful in understanding period-to-period comparisons in our revenues.

	Year Ended December 31, 2017				
	Revenues	Substrate Sales	Value-add Revenues	Currency Impact on Value-add Revenues	Value-add Revenues excluding Currency
	(Millions)				
Clean Air Division					
North America	$ 3,101	$ 1,054	$ 2,047	$ 1	$ 2,046
Europe & South America	2,207	832	1,375	38	1,337
Asia Pacific	1,209	301	908	(4)	912
Total Clean Air Division	6,517	2,187	4,330	35	4,295
Ride Performance Division					
North America	1,224	—	1,224	1	1,223
Europe & South America	1,076	—	1,076	29	1,047
Asia Pacific	457	—	457	4	453
Total Ride Performance Division	2,757	—	2,757	34	2,723
Total Tenneco Inc.	$ 9,274	$ 2,187	$ 7,087	$ 69	$ 7,018

	Year Ended December 31, 2016				
	Revenues	Substrate Sales	Value-add Revenues	Currency Impact on Value-add Revenues	Value-add Revenues excluding Currency
	(Millions)				
Clean Air Division					
North America	$ 3,003	$ 1,052	$ 1,951	$ —	$ 1,951
Europe & South America	1,939	718	1,221	—	1,221
Asia Pacific	1,127	258	869	—	869
Total Clean Air Division	6,069	2,028	4,041	—	4,041
Ride Performance Division					
North America	1,234	—	1,234	—	1,234
Europe & South America	909	—	909	—	909
Asia Pacific	387	—	387	—	387
Total Ride Performance Division	2,530	—	2,530	—	2,530
Total Tenneco Inc.	$ 8,599	$ 2,028	$ 6,571	$ —	$ 6,571

	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 Division				
North America	$ 98	3 %	$ 95	5 %
Europe & South America	268	14 %	116	10 %
Asia Pacific	82	7 %	43	5 %
Total Clean Air Division	448	7 %	254	6 %
Ride Performance Division				
North America	(10)	(1)%	(11)	(1)%
Europe & South America	167	18 %	138	15 %
Asia Pacific	70	18 %	66	17 %
Total Ride Performance Division	227	9 %	193	8 %
Total Tenneco Inc.	$ 675	8 %	$ 447	7 %

Light Vehicle Industry Production by Region for Years Ended December 31, 2017 and 2016 (According to IHS Automotive, January 2018)

	Year Ended December 31,			
	2017	2016	Increase (Decrease)	% Increase (Decrease)
	(Number of Vehicles in Thousands)			
North America	17,128	17,837	(709)	(4)%
Europe	22,229	21,540	689	3 %
South America	3,286	2,737	549	20 %
Total Europe & South America	25,515	24,277	1,238	5 %
China	27,637	27,064	573	2 %
India	4,456	4,175	281	7 %

Clean Air revenue was up $448 million in 2017 compared to 2016 with higher volumes in all segments. In North America, higher volumes drove a $104 million revenue increase due to increased OE light vehicle and commercial truck, off-highway and other sales, as well as new platforms. Currency had a $1 million favorable impact on North American revenues. In the European and South American segment, higher volumes drove a $222 million increase in revenues mainly due to increased OE light vehicle and commercial truck, off-highway and other vehicle sales in the region and new platforms in Europe, partially offset by lower aftermarket sales in Europe. Currency had a $56 million favorable impact on European and South American revenues. In Asia Pacific, higher volumes of $97 million were mainly driven by increased OE light vehicle and commercial truck revenues in China and India as well as higher off-highway and other revenue in Japan, partially offset by lower OE light vehicle revenue in Australia. Currency had a $5 million unfavorable impact on Asia Pacific revenues.

Ride Performance revenue was up $227 million in 2017 compared to 2016. In North America, lower volumes of $25 million were mainly driven by lower aftermarket volumes partially offset by higher OE light vehicle and commercial truck sales and new platforms. Currency had a $1 million favorable impact on North American revenues. In the European and South American segment, higher volumes of $122 million were driven by increases in OE light vehicle, commercial truck and off-highway and other and aftermarket sales in the region and new platforms in Europe. Currency had a $29 million favorable impact on European and South American revenues. In Asia Pacific, higher volumes of $72 million were mainly driven by increased OE light vehicle volumes in China and India and higher aftermarket sales in the region partially offset by lower volumes in Australia. Currency had a $4 million favorable impact on Asia Pacific revenues.

Net Sales and Operating Revenues for Years 2016 and 2015

The following tables reflect our revenues for the years of 2016 and 2015. See "Net Sales and Operating Revenues for Years 2017 and 2016" for a description of why we present these reconciliations of revenue.

	Year Ended December 31, 2016				
	Revenues	Substrate Sales	Value-add Revenues	Currency Impact on Value-add Revenues	Value-add Revenues excluding Currency
			(Millions)		
Clean Air Division					
North America	$ 3,003	$ 1,052	$ 1,951	$ (1)	$ 1,952
Europe & South America	1,939	718	1,221	(57)	1,278
Asia Pacific	1,127	258	869	(44)	913
Total Clean Air Division	6,069	2,028	4,041	(102)	4,143
Ride Performance Division					
North America	1,234	—	1,234	(13)	1,247
Europe & South America	909	—	909	(46)	955
Asia Pacific	387	—	387	(21)	408
Total Ride Performance Division	2,530	—	2,530	(80)	2,610
Total Tenneco Inc.	$ 8,599	$ 2,028	$ 6,571	$ (182)	$ 6,753

	Year Ended December 31, 2015				
	Revenues	Substrate Sales	Value-add Revenues	Currency Impact on Value-add Revenues	Value-add Revenues excluding Currency
			(Millions)		
Clean Air Division					
North America	$ 2,823	$ 979	$ 1,844	$ —	$ 1,844
Europe & South America	1,792	648	1,144	—	1,144
Asia Pacific	1,080	261	819	—	819
Total Clean Air Division	5,695	1,888	3,807	—	3,807
Ride Performance Division					
North America	1,313	—	1,313	—	1,313
Europe & South America	846	—	846	—	846
Asia Pacific	327	—	327	—	327
Total Ride Performance Division	2,486	—	2,486	—	2,486
Total Tenneco Inc.	$ 8,181	$ 1,888	$ 6,293	$ —	$ 6,293

	Year Ended December 31, 2016 Versus Year Ended December 31, 2015 Dollar and Percent Increase (Decrease)			
	Revenues	Percent	Value-add Revenues excluding Currency	Percent
	(Millions Except Percent Amounts)			
Clean Air Division				
North America	$ 180	6 %	$ 108	6 %
Europe & South America	147	8 %	134	12 %
Asia Pacific	47	4 %	94	11 %
Total Clean Air Division	374	7 %	336	9 %
Ride Performance Division				
North America	(79)	(6)%	(66)	(5)%
Europe & South America	63	7 %	109	13 %
Asia Pacific	60	18 %	81	25 %
Total Ride Performance Division	44	2 %	124	5 %
Total Tenneco Inc.	$ 418	5 %	$ 460	7 %

Light Vehicle Industry Production by Region for Years Ended December 31, 2016 and 2015 (Updated according to IHS Automotive, January 2018)

	Year Ended December 31,			
	2016	2015	Increase (Decrease)	% Increase (Decrease)
	(Number of Vehicles in Thousands)			
North America	17,837	17,495	342	2 %
Europe	21,540	20,936	604	3 %
South America	2,737	3,073	(336)	(11)%
Total Europe & South America	24,277	24,009	268	1 %
China	27,064	23,679	3,385	14 %
India	4,175	3,807	368	10 %

Clean Air revenue was up $374 million in 2016 compared to 2015 with higher volumes in all segments. In North America, higher volumes drove a $218 million revenue increase due to increased OE light vehicle sales and new platforms offset partially by lower commercial truck, off-highway and other vehicle revenue and lower aftermarket revenue. Currency had a $1 million unfavorable impact on North American revenues. In the European and South American segment, higher volumes drove a $242 million increase in revenues mainly due to increased OE light vehicle sales across the region, higher commercial truck, off-highway and other vehicle revenue and new platforms in Europe. Currency had an $84 million unfavorable impact on European and South American revenues. In Asia Pacific, higher volumes of $130 million were mainly driven by increased OE light vehicle sales and new programs in China and higher commercial truck, off-highway and other vehicle revenue in China and Japan. Currency had a $55 million unfavorable impact on Asia Pacific revenues.

Ride Performance revenue was up $44 million in 2016 compared to 2015. In North America, lower volumes of $100 million were driven by lower volumes in OE light vehicle, commercial truck and aftermarket revenues net of favorable mix. Currency had a $13 million unfavorable impact on North American revenues. In the European and South American segment, higher volumes of $110 million were driven by increases in light vehicle sales across the region and higher aftermarket sales in Europe and South America, which were partially offset by lower commercial truck and off-highway vehicle revenues in Europe reflecting the sale of the Marzocchi specialty business. Currency had a $46 million unfavorable impact on European and South American revenues. In Asia Pacific, higher volumes of $83 million were mainly driven by increased OE light vehicle volumes in China. Currency had a $21 million unfavorable impact on Asia Pacific revenues.

Earnings before Interest Expense, Income Taxes and Noncontrolling Interests ("EBIT") for Years 2017 and 2016

	Year Ended December 31,		
	2017	2016	Change
	(Millions)		
Clean Air Division			
North America	$ 203	$ 220	$ (17)
Europe & South America	112	98	14
Asia Pacific	133	150	(17)
Total Clean Air Division	448	468	(20)
Ride Performance Division			
North America	120	157	(37)
Europe & South America	21	16	5
Asia Pacific	58	63	(5)
Total Ride Performance Division	199	236	(37)
Other	(230)	(188)	(42)
Total Tenneco Inc.	$ 417	$ 516	$ (99)

The EBIT results shown in the preceding table include the following items, certain of which are discussed below under "Restructuring and Other Charges," which have an effect on the comparability of EBIT results between periods:

	Year Ended December 31,	
	2017	2016
	(Millions)	
Clean Air Division		
North America		
Restructuring and related expenses	$ 3	$ —
Europe & South America		
Restructuring and related expenses	11	3
Asia Pacific		
Restructuring and related expenses	16	4
Total Clean Air Division	30	7
Ride Performance Division		
North America		
Restructuring and related expenses	13	6
Warranty settlement (1)	7	—
Europe & South America		
Restructuring and related expenses	12	20
Goodwill impairment charge (2)	11	—
Asia Pacific		
Restructuring and related expenses	13	1
Total Ride Performance Division	56	27
Other		
Restructuring and related expenses	4	2
Pension charges / Stock vesting charges (3)	13	72
Antitrust settlement accrual (4)	132	—
Gain on sale of unconsolidated JV (5)	(5)	—
Total Other	144	74
Total Tenneco Inc.	$ 230	$ 108

(1) Warranty settlement with a customer.
(2) Non-cash asset impairment charge related to goodwill for the Europe and South America Ride Performance reporting unit.

(3) Charges related to pension derisking and the acceleration of restricted stock vesting in accordance with the long-term incentive plan.
(4) Charges related to establishing a reserve for settlement costs necessary to resolve the company's antitrust matters globally.
(5) Gain on sale of unconsolidated JV.

EBIT for the Clean Air division was $448 million in 2017 compared to $468 million in 2016. EBIT for North America decreased $17 million to $203 million in 2017 versus 2016. The benefit from higher OE light vehicle and commercial truck, off-highway and other sales and new platforms was more than offset by higher restructuring and related expenses, the timing of contractual cost recovery of alloy surcharge increases, and negative currency. Europe and South America's EBIT was $112 million in 2017 and $98 million in 2016. The benefit from increased OE light vehicle volumes and higher commercial truck, off-highway and other vehicles sales in the region, new platforms in Europe, operational efficiencies and positive currency was partially offset by lower aftermarket sales in Europe, higher restructuring and related expenses and higher costs associated with launching light vehicle, commercial truck and off-highway programs. EBIT for Asia Pacific decreased $17 million to $133 million in 2017 from $150 million in 2016. EBIT benefited from higher OE light vehicle and commercial truck revenues in China and India as well as higher OE off-highway and other revenues in Japan, which was more than offset by lower OE light vehicle revenues in Australia, the timing of steel recoveries, higher restructuring and related expenses and negative currency. For the Clean Air division, restructuring and related expenses of $30 million were included in EBIT for 2017 and $7 million were included in EBIT for the same period in 2016. Currency had a $3 million favorable impact on EBIT of the Clean Air division for 2017 when compared to 2016.

EBIT for the Ride Performance division was $199 million in 2017 compared to $236 million in 2016. EBIT for North America decreased $37 million in 2017 to $120 million from $157 million in 2016, driven by lower volumes in aftermarket, a warranty settlement with a customer, the timing of steel recoveries, and higher restructuring and related expenses, which more than offset higher OE light vehicle and commercial truck sales and new platforms. Europe and South America's EBIT was $21 million in 2017 and $16 million in 2016. The benefit from higher light vehicle, aftermarket and commercial truck, off-highway and other vehicle revenues in the region, new platforms in Europe and lower restructuring and related expenses was partially offset by the timing of steel recoveries, higher manufacturing costs, a goodwill impairment charge due to a longer recovery period for this reporting unit’s financial performance than previously expected and unfavorable currency. EBIT for Asia Pacific decreased to $58 million in 2017 from $63 million in 2016, driven by lower volumes in Australia, higher restructuring and related expenses and negative currency partially offset by higher OE light vehicle volumes in China and India and higher aftermarket sales in the region. For the Ride Performance division, restructuring and related expenses of $38 million were included in EBIT for 2017 and $27 million for the same period in 2016. Additionally, a warranty settlement charge of $7 million and a goodwill impairment charge of $11 million were recorded in 2017. Currency had a $3 million unfavorable impact on EBIT of the Ride Performance division for 2017 when compared to 2016.

Currency had no impact on overall company EBIT for 2017 as compared to 2016.

EBIT for Years 2016 and 2015

	Year Ended December 31, 2016	2015	Change
	(Millions)		
Clean Air Division			
North America	$ 220	$ 244	$ (24)
Europe & South America	98	49	49
Asia Pacific	150	114	36
Total Clean Air Division	468	407	61
Ride Performance Division			
North America	157	155	2
Europe & South America	16	(11)	27
Asia Pacific	63	44	19
Total Ride Performance Division	236	188	48
Other	(188)	(87)	(101)
Total Tenneco Inc.	$ 516	$ 508	$ 8

The EBIT results shown in the preceding table include the following items, certain of which are discussed below under "Restructuring and Other Charges," which have an effect on the comparability of EBIT results between periods:

	Year Ended December 31,	
	2016	2015
	(Millions)	
Clean Air Division		
Europe & South America		
Restructuring and related expenses	$ 3	$ 6
Asia Pacific		
Restructuring and related expenses	4	4
Total Clean Air Division	7	10
Ride Performance Division		
North America		
Restructuring and related expenses	6	2
Europe & South America		
Restructuring and related expenses	20	49
Asia Pacific		
Restructuring and related expenses	1	2
Total Ride Performance Division	27	53
Other		
Restructuring and related expenses	2	—
Pension/Postretirement charges (1)	72	4
Total Other	74	4
Total Tenneco Inc.	$ 108	$ 67

(1) Charges related to pension derisking.

EBIT for the Clean Air division was $468 million in 2016 compared to $407 million in 2015. EBIT for North America decreased $24 million, to $220 million, in 2016 versus 2015. The benefit from higher OE light vehicle sales, new platforms and favorable currency was more than offset by lower aftermarket revenue, lower commercial truck and off-highway vehicle revenue, higher manufacturing costs and higher SG&A expense. Europe and South America's EBIT was $98 million in 2016 and $49 million in 2015. The benefit from higher light vehicle volumes, higher commercial truck, off-highway and other vehicle revenue, favorable mix and new platforms in Europe as well as lower restructuring and related expenses and year-over-year restructuring savings was partially offset by negative currency. EBIT for Asia Pacific increased $36 million to $150 million in 2016 from $114 million in 2015. EBIT benefited from increased OE light vehicle sales and new platforms in China, higher commercial truck, off-highway and other vehicle revenue in China and Japan as well as strong operational cost management, partially offset by higher SG&A expense and negative currency. For the Clean Air division, $7 million restructuring and related expenses were included in EBIT for 2016, whereas $10 million were included for 2015. EBIT for Clean Air division also benefited from the timing of a customer recovery in China of $5 million in 2015. Currency had a $23 million unfavorable impact on EBIT of the Clean Air division for 2016 when compared to 2015.

EBIT for the Ride Performance division was $236 million in 2016 compared to $188 million in 2015. EBIT for North America increased $2 million in 2016 to $157 million from $155 million in 2015. The benefit of improved operational cost management was partially offset by lower volumes in light vehicle, commercial truck and aftermarket revenues net of favorable mix, higher restructuring and related expenses and negative currency. Europe and South America's EBIT was $16 million in 2016 and negative $11 million in 2015. The benefit from higher light vehicle sales in the region, higher aftermarket sales in Europe and South America, lower restructuring and related expenses and savings from prior restructuring activities was partially offset by unfavorable mix in Europe, lower commercial truck, off-highway and other vehicle revenue in Europe reflecting the sale of the Marzocchi specialty business and negative currency. EBIT for Asia Pacific increased to $63 million in 2016 from $44 million in 2015, mainly driven by higher light vehicle volumes in China and lower restructuring and related expenses which were partially offset by higher SG&A and engineering expenses and negative currency. For the Ride Performance division, restructuring and related expenses of $27 million were included in EBIT for 2016 and $53 million for 2015. Currency had a $10 million unfavorable impact on EBIT of the Ride Performance division for 2016 when compared to 2015.

Currency had a $33 million unfavorable impact on overall company EBIT for 2016 as compared to 2015.

EBIT as a Percentage of Revenue for Years 2017, 2016 and 2015

	Year Ended December 31,		
	2017	2016	2015
Clean Air Division			
North America	7%	7%	9%
Europe & South America	5%	5%	3%
Asia Pacific	11%	13%	11%
Total Clean Air Division	7%	8%	7%
Ride Performance Division			
North America	10%	13%	12%
Europe & South America	2%	2%	(1)%
Asia Pacific	13%	16%	13%
Total Ride Performance Division	7%	9%	8%
Total Tenneco Inc.	4%	6%	6%

In the Clean Air division, EBIT as a percentage of revenues for 2017 was down one percentage point compared to 2016. In North America, EBIT as a percentage of revenues for 2017 was even compared to 2016. The benefit from higher OE light vehicle and commercial truck, off-highway and other vehicle sales and new platforms was offset by higher restructuring and related expenses, the timing of contractual cost recovery of alloy surcharge increases, and negative currency. Europe and South America's EBIT as a percentage of revenues for 2017 was even compared to 2016. The benefit from increased OE light vehicle volumes and higher commercial truck, off-highway and other vehicles sales in the region, new platforms in Europe, operational efficiencies and positive currency was offset by lower aftermarket sales in Europe, higher restructuring and related expenses and higher costs associated with launching light vehicle, commercial truck and off-highway programs. EBIT as a percentage of revenues for Asia Pacific in 2017 was down two percentage points compared to 2016. The benefit from higher OE light vehicle and commercial truck sales in China and India as well as higher OE off-highway and other revenues in Japan was more than offset by lower OE light vehicle revenues in Australia, the timing of steel recoveries, higher restructuring and related expenses and negative currency.

In the Ride Performance division, EBIT as a percentage of revenues was down two percentage points compared to 2016. In 2017, EBIT as a percentage of revenues for North America was down three percentage points compared to 2016, driven by lower volumes in aftermarket, a warranty settlement with a customer, the timing of steel recoveries, and higher restructuring and related expenses, which more than offset higher OE light vehicle and commercial truck sales and new platforms. EBIT as a percentage of revenues in Europe and South America was even compared to 2016. The benefit from higher light vehicle, aftermarket and commercial truck, off-highway and other vehicle revenues in the region, new platforms in Europe and lower restructuring and related expenses was offset by the timing of steel recoveries, higher manufacturing costs, a goodwill impairment charge due to a longer recovery period for this reporting unit's financial performance than previously expected and unfavorable currency. In Asia Pacific, EBIT as a percentage of revenues for 2017 was down three percentage points compared to 2016, driven by lower volumes in Australia, higher restructuring and related expenses and negative currency, which more than offset higher OE light vehicle volumes in China and India and higher aftermarket sales in the region.

In the Clean Air division, EBIT as a percentage of revenues for 2016 was up one percentage point compared to 2015. In North America, EBIT as a percentage of revenues for 2016 was down two percentage points compared to 2015. The benefit from higher OE light vehicle sales, new platforms and favorable currency was more than offset by lower aftermarket revenue, lower commercial truck and off-highway vehicle revenue, higher manufacturing costs and higher SG&A expense. Europe and South America's EBIT as a percentage of revenues for 2016 was up two percentage points compared to 2015. The benefit from higher light vehicle volumes, higher commercial truck, off-highway and other vehicle revenue, favorable mix and new platforms in Europe as well as lower restructuring and related expenses and year-over-year restructuring savings was partially offset by negative currency. EBIT as a percentage of revenues for Asia Pacific in 2016 was up two percentage points compared to 2015. EBIT benefited from increased OE light vehicle sales and new platforms in China, higher commercial truck, off-highway and other vehicle revenue in China and Japan as well as strong operational cost management, partially offset by higher SG&A expense, negative currency and the timing of a customer recovery in China.

In the Ride Performance division, EBIT as a percentage of revenues was up one percentage point compared to 2015. In 2016, EBIT as a percentage of revenues for North America was up one percentage point compared to 2015. The benefit of improved operational cost management was partially offset by lower volumes in light vehicle, commercial truck and aftermarket revenues net of favorable mix, higher restructuring and related expenses and negative currency. EBIT as a percentage of revenues in Europe and South America was up three percentage points compared to 2015. The benefit from higher light vehicle sales in the region, higher aftermarket sales in Europe and South America, lower restructuring and related expenses and savings from prior restructuring activities was partially offset by unfavorable mix in Europe, lower commercial truck, off-highway and other vehicle revenue in Europe reflecting the sale of the Marzocchi specialty business and negative currency. In Asia Pacific, EBIT as a percentage of revenues for 2016 was up three percentage points compared to 2015, mainly driven by higher light vehicle volumes in China and lower restructuring and related expenses which were partially offset by higher SG&A and engineering expenses and negative currency.

Interest Expense, Net of Interest Capitalized

We reported interest expense in 2017 of $73 million (substantially all in our U.S. operations) net of interest capitalized of $8 million, and $92 million (substantially all in our U.S. operations) net of interest capitalized of $6 million in 2016. Included in 2017 was $1 million of expense related to our refinancing activities. Included in 2016 was $24 million of expense related to our refinancing activities.

We reported interest expense in 2016 of $92 million (substantially all in our U.S. operations) net of interest capitalized of $6 million, and $67 million (substantially all in our U.S. operations) net of interest capitalized of $6 million in 2015. Included in 2016 was $24 million of expense related to our refinancing activities. Excluding the refinancing expenses, interest expense increased by $1 million in 2016 compared to 2015.

On December 31, 2017, we had $739 million in long-term debt obligations that have fixed interest rates. Of that amount, $500 million is fixed through July 2026, $225 million is fixed through December 2024 and the remainder is fixed through 2025. We also have $637 million in long-term debt obligations that are subject to variable interest rates. 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

We reported income tax expense of $70 million in 2017. The tax expense recorded in 2017 included 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. This amount is subject to change as we refine our earnings and profits calculations and as additional guidance is published. The transition tax will result in cash tax payments of less than $1 million to U.S. state and local jurisdictions. Foreign tax credits will offset the U.S. federal portion of the transition tax. 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. The Company will continue to refine its estimates throughout the measurement period provided for in SEC Staff Accounting Bulletin 118, or until its accounting is complete. We reported income tax expense of less than $1 million in 2016. The tax expense recorded in 2016 included a net tax benefit of $110 million primarily relating to recognizing a U.S. tax benefit for foreign taxes. In 2016, we completed our detailed analysis of our ability to recognize and utilize foreign tax credits within the carryforward period. As a result, we amended our 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 with regard to dividends, interest and royalties paid to us in the U.S. Income tax expense also decreased in 2016 as a result of the mix of earnings in our various tax jurisdictions. We reported income tax expense of $146 million in 2015. The tax expense recorded in 2015 included a net tax benefit of $15 million primarily relating to prior year U.S. research and development tax credits, changes to uncertain tax positions, and prior year income tax adjustments.

Our uncertain tax position at December 31, 2017 and 2016 included exposures relating to the disallowance of deductions, global transfer pricing and various other issues. We believe it is reasonably possible that up to $8 million in unrecognized tax benefits related to the expiration of foreign statute of limitations and the conclusion of income tax examinations may be recognized within the next twelve months.

Our state net operating losses ("NOLs") expire in various tax years through 2038. Our non-U.S. NOLs expire in various tax years through 2037, or have unlimited carryforward potential.

Restructuring and Other Charges

Over the past several years, we have adopted plans to restructure portions of our operations. These plans were approved by our Board of Directors and were designed to reduce operational and administrative overhead costs throughout the business. In 2015, we incurred $63 million in restructuring and related costs including asset write-downs of $10 million, primarily related to European cost reduction efforts, exiting the Marzocchi suspension business, headcount reductions in Australia and South America, and the closure of a JIT plant in Australia, of which $46 million was recorded in cost of sales, $11 million in SG&A,

$1 million in engineering expense, $1 million in other expense and $4 million in depreciation and amortization expense. In 2016, we incurred $36 million in restructuring and related costs including asset write-downs of $6 million, primarily related to manufacturing footprint improvements in North America Ride Performance, headcount reduction and cost improvement initiatives in Europe and China Clean Air, South America and Australia, of which $17 million was recorded in cost of sales, $12 million in SG&A, $1 million in engineering, $2 million in other expense and $4 million in depreciation and amortization expense. In 2017, we incurred $72 million in restructuring and related costs including asset write-downs of $3 million, primarily related to the planned closing a Clean Air Belgian JIT plant in response to the end of production on a customer platform, closing an OE Clean Air manufacturing plant and downsizing Ride Performance operations in Australia, the accelerated move of our Beijing Ride Performance plant and other cost improvement initiatives, of which $41 million was recorded in cost of sales, $28 million in SG&A and $3 million in depreciation and amortization expense.

Amounts related to activities that are part of our restructuring plans are as follows:

	December 31, 2016 Restructuring Reserve	2017 Expenses	2017 Cash Payments	Impact of Exchange Rates	December 31, 2017 Restructuring Reserve
			(Millions)		
Employee Severance, Termination Benefits and Other Related Costs	$ 15	49	(41)	2	$ 25

On January 31, 2013, we announced our intent to reduce structural costs in Europe by approximately $60 million annually. During the first quarter of 2016, we reached an annualized run rate on this cost reduction initiative of $49 million.
With the disposition of the Gijon plant, which was completed at the end of the first quarter, the annualized rate essentially reached our target of $55 million at the current exchange rates at that time. In 2015, we incurred $63 million in restructuring and related costs, of which $22 million was related to this initiative. In 2016, we incurred $36 million in restructuring and related costs, of which $20 million was related to this initiative and certain ongoing matters. For example, we closed the Gijon plant in 2013, but subsequently re-opened it in July 2014 with about half of its prior workforce after the employees' works council successfully filed suit challenging the closure decision. Pursuant to an agreement we entered into with employee representatives, we engaged in a sales process for the facility. In March of 2016, we signed an agreement to transfer ownership of the aftermarket shock absorber manufacturing facility in Gijon, Spain to German private equity fund Quantum Capital Partners A.G. (QCP). The transfer to QCP was effective March 31, 2016 and under a three year manufacturing agreement, QCP will also continue as a supplier to Tenneco.

On July 22, 2015, we announced our intention to discontinue our Marzocchi motorcycle fork suspension product line and our mountain bike suspension product line, and liquidate our Marzocchi operations. These actions were subject to a consultation process with the employee representatives and in total eliminated approximately 138 jobs. We employed 127 people at the Marzocchi plant in Bologna, Italy and an additional 11 people in our operations in North America and Taiwan. In November 2015, we closed on the sale of certain assets related to our Marzocchi mountain bike suspension product line to the affiliates of Fox Factory Holding Corp.; and in December 2015, we closed on the sale of the Marzocchi motorcycle fork product line to an Italian company, VRM S.p.A. These actions were a part of our ongoing efforts to optimize our Ride Performance product line globally while continuously improving our operations and increasing profitability. We recorded charges of $29 million in 2015 related to severance and other employee related costs, asset write-downs and other expenses related to the closure.

On June 29, 2017, we announced a restructuring initiative to close our Clean Air manufacturing plant in O'Sullivan Beach, Australia and downsize our Ride Performance plant in Clovelly Park, Australia when General Motors and Toyota end vehicle production in the country, which occurred in October 2017. All such restructuring activities related to this initiative are expected to be completed by the first quarter of 2018. We 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 2017, we continued the relocation of production out of our Ride Performance plant in Beijing for which we incurred $6 million of restructuring and related costs. In the first quarter of 2017, we recognized a $10 million charge, including asset write-downs of $1 million , related to the planned closing of our Clean Air JIT plant in Ghent, Belgium due to the scheduled end of production on a customer platform in 2020. We incurred an additional $35 million in restructuring and related costs for cost improvement initiatives at various other operations around the world.

Under the terms of our amended and restated senior credit agreement that took effect on May 12, 2017, we are allowed to exclude, at our discretion, (i) up to $35 million in 2017 and $25 million each year thereafter of cash restructuring charges and related expenses, with the ability to carry forward any amount not used in one year to the next following year, and (ii) up to $150 million in the aggregate of all costs, expenses, fees, fines, penalties, judgments, legal settlements and other amounts associated with any restructuring, litigation, claim, proceeding or investigation related to or undertaken by us or any of our subsidiaries, together with any related provision for taxes, incurred in any period ending after May 12, 2017 in the calculation of the financial covenant ratios required under our senior credit facility. As of December 31, 2017, we elected not to exclude any of the $185 million of allowable cash charges and related expenses recognized in 2017 for restructuring related costs and antitrust settlement and against the $35 million annual limit for 2017 and the $150 million aggregate limit available under the terms of the senior credit facility.

Earnings Per Share

We reported net income attributable to Tenneco Inc. of $207 million or $3.91 per diluted common share for 2017. Included in 2017 were negative impacts from expenses related to our restructuring activities, charges related to pension derisking and the acceleration of restricted stock vesting, cost related to our refinancing activities, warranty settlement, antitrust settlement accrual, a goodwill impairment charge and tax adjustments from US tax reform, which was partially offset by a positive impact from the gain on sale of an unconsolidated JV and net tax benefits. The total impact of these items decreased earnings per diluted share by $2.98. We reported net income attributable to Tenneco Inc. of $356 million or $6.31 per diluted common share for 2016. Included in the results for 2016 were positive impacts from a net tax benefit associated with the recognition of a U.S. tax benefit for foreign taxes partially offset by negative impacts from expenses related to our restructuring activities, costs related to our refinancing activities and settlement charges related to pension buyout. The total impact of these items increased earnings per diluted share by $0.29. We reported net income attributable to Tenneco Inc. of $241 million or $4.01 per diluted common share for 2015. Included in the results for 2015 were negative impacts from expenses related to our restructuring activities and charges related to pension derisking, which were partially offset by net tax benefits. The total impact of these items decreased earnings per diluted share by $0.76.

Dividends on Common Stock

On February 1, 2017, Tenneco announced the reinstatement of a quarterly dividend program. 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. 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 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 our debt agreements. We did not pay any dividends in fiscal years 2016 or 2015.

Cash Flows for 2017 and 2016

	Year Ended December 31,	
	2017	**2016**
	(Millions)	
Cash provided (used) by:		
Operating activities	$ 629	$ 484
Investing activities	(413)	(340)
Financing activities	(251)	(86)

Operating Activities

For 2017, operating activities provided $629 million in cash compared to $484 million cash provided during 2016. For 2017, cash provided by working capital was $95 million versus $126 million of cash used for working capital in 2016. Receivables were a source of cash of $31 million for 2017 compared to a use of cash of $215 million in 2016. Inventory represented a cash outflow of $96 million for 2017 and a cash outflow of $57 million during 2016. Accounts payable provided $129 million of cash for the year ended December 31, 2017, compared to $114 million of cash provided for the year ended December 31, 2016. The cash performance in 2017 also included $107 million from an accounts receivable factoring program established in the fourth quarter of the year. Cash taxes were $95 million for 2017 compared to $113 million in 2016.

Investing Activities

Cash used for investing activities was $73 million higher in 2017 compared to 2016. Cash payments for plant, property and equipment were $394 million in 2017 versus payments of $325 million in 2016, an increase of $69 million. Cash payments for software-related intangible assets were $25 million in 2017 compared to $20 million in 2016. Change in restricted cash was a use of cash of $1 million in both 2017 and 2016.

Financing Activities

Cash flow from financing activities was an outflow of $251 million for the year ended December 31, 2017 compared to an outflow of $86 million for the year ended December 31, 2016. 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 percent 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, 2017, we had $231 million remaining on the share repurchase authorization. In 2017, we paid a dividend of $0.25 per share in each quarter, or $53 million in the aggregate.

On May 12, 2017, we completed a refinancing of our senior credit facility by entering into an amendment and restatement of that facility. The amended and restated credit agreement enhances financial flexibility by increasing the size and extending the term of its revolving credit facility and term loan facility, and by adding Tenneco Automotive Operating Company Inc. as a co-borrower under the revolver credit facility. The amended and restated credit agreement also adds foreign currency borrowing capability and permits the joinder of our foreign and domestic subsidiaries as borrowers under the revolving credit facility in the future. If any foreign subsidiary of ours 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 ours in the chain of ownership of such foreign borrower. The amended and restated credit facility consists of a $1,600 million revolving credit facility and a $400 million term loan A facility, which replaced our former $1,200 million revolving credit facility and $264 million term loan A facility, respectively. As of December 31, 2017, the senior credit facility provides us with a total revolving credit facility of $1,600 million and had a $390 million balance outstanding under the term loan A facility, both of which will mature on May 12, 2022. In 2016, refinancing activities included the issuance of $500 million of new 5 percent senior secured notes due 2026 to refinance our existing 6 $^{7}/_{8}$ percent senior notes due 2020.

Borrowings under our revolving credit facility were $244 million at December 31, 2017 and $300 million at December 31, 2016. There was $30 million borrowed under the U.S. accounts receivable securitization programs at both the period ending December 31, 2017 and December 31, 2016.

Cash Flows for 2016 and 2015

	Year Ended December 31,	
	2016	**2015**
	(Millions)	
Cash provided (used) by:		
Operating activities	$ 484	$ 528
Investing activities	(340)	(303)
Financing activities	(86)	(183)

Operating Activities

For 2016, operating activities provided $484 million in cash compared to $528 million cash provided during 2015. The lower cash from operations was primarily due to the timing of revenue growth at the end of the year and the resulting impact on accounts receivable. For 2016, cash used for working capital was $126 million versus $9 million of cash used for working capital in 2015. Receivables were a use of cash of $215 million for 2016 compared to a use of cash of $90 million in 2015. Inventory represented a cash outflow of $57 million for 2016 and a cash outflow of $36 million during 2015. Accounts payable provided $114 million of cash for the year ended December 31, 2016, compared to $90 million of cash provided for the year ended December 31, 2015. Cash taxes were $113 million for 2016 compared to $105 million in 2015, net of a US tax refund of $25 million for overpayment in 2014.

Investing Activities

Cash used for investing activities was $37 million higher in 2016 compared to 2015. Cash payments for plant, property and equipment were $325 million in 2016 versus payments of $286 million in 2015, an increase of $39 million. Cash payments for software-related intangible assets were $20 million in 2016 compared to $23 million in 2015. Change in restricted cash was a use of cash of $1 million in 2016 compared to a source of cash of $2 million in 2015.

Financing Activities

Cash flow from financing activities was an outflow of $86 million for the year ended December 31, 2016 compared to an outflow of $183 million for the year ended December 31, 2015. 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. During 2015, we repurchased 4,228,633 shares of our outstanding common stock for $213 million at an average price of $50.32 per share as part of the previously announced stock buyback plan of up to $350 million. Since announcing our share repurchase program in 2015, we have repurchased a total of approximately 8.4 million shares for $438 million, representing 14 percent of the shares outstanding at that time. On February 1, 2017, our Board of Directors declared a cash dividend of $0.25, payable on March 23, 2017 to shareholders of record as of March 7, 2017. In addition, 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. In 2016, refinancing activities included the issuance of $500 million of new 5 percent senior secured notes due 2026 to refinance our existing 6 $^{7}/_{8}$ percent senior notes due 2020.

Borrowings under our revolving credit facility were $300 million at December 31, 2016 and $105 million at December 31, 2015. There was $30 million borrowed under the U.S. accounts receivable securitization programs at each of the period ending December 31, 2016 and December 31, 2015.

Outlook

All of our forward looking revenue estimates reflect constant currency.

First Quarter 2018

We expect constant currency total revenue growth of three percent in the first quarter 2018, outpacing a flat light vehicle industry production growth forecast. We expect organic growth to outpace the industry with revenues driven by the ramp up of recently launched programs and our strong position on light vehicle platforms globally, double-digit year-over-year growth in commercial truck and off-highway revenues and a solid contribution from the global aftermarket.

Full Year 2018

We expect five percent organic growth in constant currency total revenue, outpacing light vehicle industry production by three percentage points, with increases in both the Ride Performance and Clean Air product lines. We expect our organic growth in 2018 to be driven by:

- Content growth on light and commercial vehicle platforms;
- The continued industry recovery in regulated off-highway regions.

Our revenue growth estimate assumes light vehicle industry production growth of two percent, global commercial truck production growth about flat, off-highway engine production in regulated regions up by low double-digits, organic growth is net of OE price downs and substrates estimated at 24 percent to 25 percent of total revenue.

We expect our capital expenditures for 2018 to be between $380 million and $410 million, our 2018 interest expense to be between $75 million to $80 million, our 2018 cash taxes to be between $105 million and $125 million and our 2018 tax rate to be between 23 percent to 25 percent.

Full Year 2019 and 2020

In 2019 and 2020, we expect revenue growth will continue to outpace industry production. In those years, we expect organic growth of six percent to eight percent in 2019, and five percent to seven percent in 2020, including the current forecasted global light vehicle production growth of two percent in each year.

Tenneco's revenue estimates presented in this “Outlook” are based on current and projected customer production schedules as well as industry production, which includes IHS Automotive January 2018 global light vehicle production forecasts, Power Systems Research (PSR) January 2018 forecast for global commercial truck and buses, PSR off-highway engine production in North America and Europe and Tenneco estimates. Tenneco’s revenue estimates are also based on original equipment manufacturers’ programs that have been formally awarded to us, programs where we are highly confident that we will be awarded business based on informal customer indications consistent with past practices, and our status as supplier for the existing programs and our relationships and experience with our customers. The revenue estimates are also based on anticipated vehicle production levels and pricing, including precious metals pricing and the impact of material cost changes. Unless otherwise indicated, our revenue estimate methodology does not attempt to forecast currency fluctuation, and accordingly reflects constant currency. See “Cautionary Statement for Purposes of the ‘Safe Harbor’ Provisions of the Private Securities Litigation Reform Act of 1995” and Item 1A, “Risk Factors.”

Other Event

In the fourth quarter of 2017, we began to accelerate a required move of our Beijing Ride Performance plant outside the Beijing area. We anticipate this move out of our Beijing plant will be complete by the end of 2018. As we move production to existing and future sites, we expect to carry higher inventory levels to protect customer deliveries, and we will incur some additional costs in connection with these moves.

Liquidity and Capital Resources

Capitalization

	Year Ended December 31, 2017	Year Ended December 31, 2016	% Change
	(Millions)		
Short-term debt and maturities classified as current	$ 83	$ 90	(8)%
Long-term debt	1,358	1,294	5
Total debt	1,441	1,384	4
Total redeemable noncontrolling interests	42	40	5
Total noncontrolling interests	46	47	(2)
Tenneco Inc. shareholders' equity	696	573	21
Total equity	742	620	20
Total capitalization	$ 2,225	$ 2,044	9 %

General. Short-term debt, which includes maturities classified as current, borrowings by parent company and foreign subsidiaries, and borrowings under our North American accounts receivable securitization program, were $83 million and $90 million as of December 31, 2017 and December 31, 2016 , respectively. Borrowings under our revolving credit facilities, which are classified as long-term debt, were $244 million and $300 million at December 31, 2017 and December 31, 2016 , respectively.

The 2017 year-to-date increase in Tenneco Inc. shareholders' equity primarily resulted from net income attributable to Tenneco Inc. of $207 million, a $14 million increase in premium on common stock and other capital surplus relating to common stock issued pursuant to benefit plans, a $27 million increase related to pension and postretirement benefits and a $97 million increase caused by the impact of changes in foreign exchange rates on the translation of financial statements of our foreign subsidiaries into U.S. dollars, partially offset by a $169 million increase in treasury stock as a result of purchases of common stock under our share purchase program and cash dividend payments of $53 million.

Overview. Our financing arrangements are primarily provided by a committed senior secured financing arrangement with a syndicate of banks and other financial institutions. The arrangement is secured by substantially all our domestic assets and pledges of up to 66 percent of the stock of certain first-tier foreign subsidiaries, as well as guarantees by our material domestic subsidiaries.

On June 6, 2016, we announced a cash tender offer to purchase our outstanding $500 million 6 ^{7}/8 percent senior notes due in 2020. We received tenders representing $325 million aggregate principal amount of the notes and, on June 13, 2016, we purchased the tendered notes at a price of 103.81 percent of the principal amount, plus accrued and unpaid interest. On July 13, 2016, we redeemed the remaining outstanding $175 million aggregate principal amount of the notes that were not purchased pursuant to the tender offer at a price of 103.438 percent of the principal amount, plus accrued and unpaid interest. We used the proceeds of the issuance of our 5 percent senior notes due 2026 to fund the purchase and redemption. The senior credit facility was used to fund the fees and expenses of the tender offer and redemption.

We recorded $16 million and $8 million of pre-tax interest charges in June and July of 2016, respectively, related to the repurchase and redemption of our 6 ^{7}/8 percent senior notes due in 2020 and the write-off of deferred debt issuance costs relating to those notes.

On May 12, 2017, we completed a refinancing of our senior credit facility by entering into an amendment and restatement of that facility. The amended and restated credit agreement enhances financial flexibility by increasing the size and extending the term of its revolving credit facility and term loan facility, and by adding Tenneco Automotive Operating Company Inc. as a co-borrower under the revolving credit facility. The amended and restated credit agreement also adds foreign currency borrowing capability and permits the joinder of our foreign and domestic subsidiaries as borrowers under the revolving credit facility in the future. If any foreign subsidiary of Tenneco 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 Tenneco in the chain of ownership of such foreign borrower. The amended and restated credit facility consists of a $1,600 million revolving credit facility and a $400 million term loan A facility, which replaced our former $1,200 million revolving credit facility and $264 million term loan A facility, respectively. As of December 31, 2017 , the senior credit facility provides us with a total revolving credit facility of $1,600 million and had a $390 million balance outstanding under the term loan A facility, both of which will mature on May 12, 2022. Net carrying amount for the balance outstanding under the term loan A facility including a $2 million debt issuance cost was $388 million as of December 31, 2017 . Funds may be borrowed, repaid and re-borrowed under the revolving credit facility without premium or penalty (subject to any customary LIBOR breakage fees). The revolving credit facility is reflected as debt on our balance sheet only if we borrow money under this facility or if we use the facility to make payments for letters of credit. Outstanding letters of credit reduce our availability to borrow revolving loans under the facility. We are required to make quarterly principal payments under the term loan A facility of $5 million through June 30, 2019, $7.5 million beginning September 30, 2019 through June 30, 2020, $10 million beginning September 30, 2020 through March 31, 2022 and a final payment of $260 million is due on May 12, 2022. We have excluded the required payments, within the next twelve months, under the term loan A facility totaling $20 million from current liabilities as of December 31, 2017 , because we have the intent and ability to refinance the obligations on a long-term basis by using our revolving credit facility.

We recorded $1 million of pre-tax interest charges in May 2017 related to amendment and restatement of the senior credit facility and the write off of deferred debt issuance costs related to the senior credit facility.

At December 31, 2017 , of the $1,600 million available under the revolving credit facility, we had unused borrowing capacity of $1,356 million with $244 million in outstanding borrowings and zero in outstanding letters of credit. As of December 31, 2017 , our outstanding debt also included (i) $390 million of a term loan which consisted of a $388 million net carrying amount including a $2 million debt issuance cost related to our term loan A facility which is subject to quarterly principal payments as described above through May 12, 2022, (ii) $225 million of notes which consisted of a $222 million net carrying amount including a $3 million debt issuance cost of 5 $^{3}/_{8}$ percent senior notes due December 15, 2024, (iii) $500 million of notes which consisted of a $492 million net carrying amount including a $8 million debt issuance cost of 5 percent senior notes due July 15, 2026, and (iv) $95 million of other debt.

We monitor market conditions with respect to the potential refinancing of our outstanding debt obligations, including our senior secured credit facility and senior notes. Depending on market and other conditions, we may seek to refinance our debt obligations from time to time. We cannot make any assurance, however, that any refinancing will be completed.

Senior Credit Facility — Interest Rates and Fees. Beginning May 12, 2017, our term loan A facility and revolving credit facility bear interest at an annual rate equal to, at our option, either (i) London Interbank Offered Rate (“LIBOR”) plus a margin of 175 basis points, or (ii) a rate consisting of the greater of (a) the JPMorgan Chase prime rate plus a margin of 75 basis points, (b) the Federal Funds rate plus 50 basis points plus a margin of 75 basis points, and (c) one month LIBOR plus 100 basis points plus a margin of 75 basis points. The margin we pay on these borrowings will be increased by a total of 25 basis points above the original margin following each fiscal quarter for which our consolidated net leverage ratio is equal to or greater than 2.5. In addition, the margin we pay on these borrowings will be reduced by a total of 25 basis points below the original margin if our consolidated net leverage ratio is less than 1.5. We also pay a commitment fee equal to 25 basis points that will be reduced to 20 basis points or increased to up to 30 basis points depending on consolidated net leverage ratio changes as set forth in the senior credit facility.

Senior Credit Facility — Other Terms and Conditions. Our senior credit facility requires that we maintain financial ratios equal to or better than the following consolidated net leverage ratio (consolidated indebtedness plus, without duplication, the domestic receivable program amount, net of unrestricted cash and cash equivalents up to $250 million, divided by consolidated EBITDA, each as defined in the senior credit facility agreement), and consolidated interest coverage ratio (consolidated EBITDA divided by consolidated interest expense, as defined in the senior credit facility agreement) at the end of each period indicated. Failure to maintain these ratios will result in a default under our senior credit facility. The financial ratios required under the senior credit facility and the actual ratios we calculated for the four quarters of 2017 , are as follows:

	Quarter Ended							
	December 31, 2017		September 30, 2017		June 30, 2017		March 31, 2017	
	Req.	Act.	Req.	Act.	Req.	Act.	Req.	Act.
Leverage Ratio (maximum)	3.50	1.95	3.50	2.15	3.50	1.97	3.50	1.62
Interest Coverage Ratio (minimum)	2.75	10.77	2.75	11.48	2.75	12.44	2.75	15.38

The senior credit facility includes a maximum leverage ratio covenant of 3.50 and a minimum interest coverage ratio of 2.75, in each case through May 12, 2022. The senior credit facility provides us with the flexibility not to exclude certain otherwise excludable charges incurred in any relevant period from the calculation of the leverage and interest coverage ratios for such period. As of December 31, 2017 , we elected not to exclude a total of $185 million of excludable charges. Had these charges been excluded, the leverage ratio and the interest ratio would have been 1.52 and 13.76 , respectively, as of December 31, 2017 .

The covenants in our senior credit facility agreement generally prohibit us from repaying or refinancing our senior notes. So long as no default existed, we would, however, under our senior credit facility agreement, be permitted to repay or refinance our senior notes (i) with the net cash proceeds of permitted refinancing indebtedness (as defined in the senior credit facility agreement) or with the net cash proceeds of our common stock, in each case issued within 180 days prior to such repayment; (ii) with the net cash proceeds of the incremental facilities (as defined in the senior credit facility agreement) and certain indebtedness incurred by our foreign subsidiaries; (iii) with the proceeds of the revolving loans (as defined in the senior credit facility agreement); (iv) with the cash generated by our operations; (v) in an amount equal to the net cash proceeds of qualified capital stock (as defined in the senior credit facility agreement) issued by us after May 12, 2017; and (vi) in exchange for permitted refinancing indebtedness or in exchange for shares of our common stock; provided that such purchases are capped as follows (with respect to clauses (iii), (iv) and (v) based on a pro forma consolidated leverage ratio after giving effect to such purchase, cancellation or redemption):

Pro forma Consolidated Leverage Ratio	Aggregate Senior Note Maximum Amount	
	(Millions)	
Greater than or equal to 3.25x	$	20
Greater than or equal to 3.0x	$	100
Greater than or equal to 2.5x	$	225
Less than 2.5x		no limit

Although the senior 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 senior 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 senior 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 senior 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; (viii) disposition of assets; and (ix) refinancing of the senior notes. Compliance with these requirements and restrictions is a condition for any incremental borrowings under the senior credit facility agreement and failure to meet these requirements enables the lenders to require repayment of any outstanding loans.

As of December 31, 2017 , we were in compliance with all the financial covenants and operational restrictions of the senior credit facility. Our senior credit facility does not contain any terms that could accelerate payment of the facility or affect pricing under the facility as a result of a credit rating agency downgrade.

Senior Notes. As of December 31, 2017 , our outstanding senior notes also included $225 million of 5 $^3/_8$ percent senior notes due December 15, 2024 which consisted of $222 million net carrying amount including a $3 million debt issuance cost and $500 million of 5 percent senior notes due July 15, 2026 which consisted of $492 million net carrying amount including a $8 million debt issuance cost. Under the indentures governing the notes, we are permitted to redeem some or all of the remaining senior notes at specified prices that decline to par over a specified period, (a) on or after July 15, 2021, in the case of the senior notes due 2026, and (b) on or after December 15, 2019, in the case of the senior notes due 2024. In addition, the notes may also be redeemed in whole or in part at a redemption price generally equal to 100 percent of the principal amount thereof plus a premium based on the present values of the remaining payments due to the note holders. Further, the indentures governing the notes also permit us to redeem up to 35 percent of the senior notes with the proceeds of certain equity offerings, (a) on or before July 15, 2019 at a redemption price equal to 105 percent, in the case of the senior notes due 2026 and (b) on or before December 15, 2017 at a redemption price equal to 105.375 percent, in the case of the senior notes due 2024. If we sell certain of our assets or experience specified kinds of changes in control, we must offer to repurchase the notes due 2026 and 2024 at 101 percent of the principal amount thereof plus accrued and unpaid interest.

Our senior notes due December 15, 2024 and July 15, 2026, respectively, contain covenants that will, among other things, limit our ability to create liens and enter into sale and leaseback transactions. Our senior notes due 2024 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 our operations, including limitations on: (i) incurring additional indebtedness; (ii) 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 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, 2017 , we were in compliance with the covenants and restrictions of these indentures.

Accounts Receivable Securitization/Factoring. We securitize or factor some of our accounts receivable on a limited recourse basis in the U.S. and Europe. As servicer under these accounts receivable securitization and factoring programs, we are responsible for performing all accounts receivable administration functions for these securitized and factored financial assets including collections and processing of customer invoice adjustments. In the U.S., we have an accounts receivable securitization program with three commercial banks comprised of a first priority facility and a second priority facility. We securitize original equipment and aftermarket receivables on a daily basis under this program. In April 2017, this U.S. program was amended and extended to April 30, 2019. The first priority facility now provides financing of up to $155 million and the second priority facility, which is subordinated to the first priority facility, now provides up to an additional $25 million of financing. Both facilities monetize accounts receivable generated in the U.S. and Canada that meet certain eligibility requirements, and the second priority facility also monetizes certain accounts receivable generated in the U.S. and Canada that would otherwise be 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 both December 31, 2017 and 2016 .

Each facility contains customary covenants for financings of this type, including restrictions related to liens, payments, mergers or consolidations and amendments to the agreements underlying the receivables pool. Further, each facility may be terminated upon the occurrence of customary events (with customary grace periods, if applicable), including breaches of covenants, failure to maintain certain financial ratios, inaccuracies of representations and warranties, bankruptcy and insolvency events, certain changes in the rate of default or delinquency of the receivables, a change of control and the entry or other enforcement of material judgments. In addition, each facility contains cross-default provisions, where the facility could be terminated in the event of non-payment of other material indebtedness when due and any other event which permits the acceleration of the maturity of material indebtedness.

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 one 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 $107 million at December 31, 2017 .

We also factor receivables in our European operations with regional banks in Europe under various separate 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 $218 million and $160 million at December 31, 2017 and December 31, 2016 , respectively.

If we were not able to securitize or factor receivables under either the U.S. or European programs, our borrowings under our revolving credit agreement might increase. These accounts receivable securitization and 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.

In our U.S. accounts receivable securitization programs, we transfer a partial interest in a pool of receivables and the interest that we retain is subordinate to the transferred interest. Accordingly, we account for our U.S. securitization program as a secured borrowing. In our U.S. and European accounts receivable factoring programs, we transfer accounts receivables in their entirety to the acquiring entities and satisfy all of the conditions established under ASC Topic 860, “Transfers and Servicing,” to report the transfer of financial assets in their entirety as a sale. The fair value of assets received as proceeds in exchange for the transfer of accounts receivable under our U.S and European factoring programs approximates the fair value of such receivables. We recognized $4 million in interest expense for the year ended 2017 , $3 million in interest expense for the year ended 2016 and $2 million in interest expense for the year ended 2015 , relating to our U.S. securitization program. In addition, we recognized a loss of $3 million for each of the years ended 2017 , 2016 and 2015 , on the sale of trade accounts receivable in our U.S. and European accounts receivable factoring programs, representing the discount from book values at which these receivables were sold to our banks. The discount rate varies based on funding costs incurred by our banks, which averaged approximately one percent for the year ended 2017 and two percent for both years ended 2016 and 2015 .

Financial Instruments. In certain instances, several of our Chinese subsidiaries receive payment from customers through the receipt of financial instruments on the date the customer payments are due. Several of our Chinese subsidiaries also satisfy vendor payments through the delivery of financial instruments on the date the payments are due. Financial instruments issued to satisfy vendor payables and not redeemed totaled $11 million and $12 million at December 31, 2017 and December 31, 2016 , respectively, and were classified as notes payable. Financial instruments received from OE customers and not redeemed totaled $10 million and $5 million at December 31, 2017 and December 31, 2016 , respectively. We classify financial instruments received from our customers as other current assets if issued by a financial institution of our customers or as customer notes and accounts if issued by our customer. We classified $10 million and $5 million in other current assets at December 31, 2017 and December 31, 2016 , respectively.

The financial instruments received by some of our Chinese subsidiaries are drafts drawn that are payable at a future date and, in some cases, are negotiable and/or are guaranteed by banks of the customers. The use of these instruments for payment follows local commercial practice. Because certain of such financial instruments are guaranteed by our customers' banks, we believe they represent a lower financial risk than the outstanding accounts receivable that they satisfy which are not guaranteed by a bank.

Supply Chain Financing. Certain of our suppliers participate in supply chain financing programs under which they securitize their accounts receivables from Tenneco. Financial institutions participate in the supply chain financing program on an uncommitted basis and can cease purchasing receivables or drafts from Tenneco's suppliers at any time. If the financial institutions did not continue to purchase receivables or drafts from Tenneco's suppliers under these programs, the participating vendors may have a need to renegotiate their payment terms with Tenneco 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 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.

Contractual Obligations.

Our remaining required debt principal amortization and payment obligations under lease and certain other financial commitments as of December 31, 2017 are shown in the following table:

	Payments due in:						
	2018	**2019**	**2020**	**2021**	**2022**	**Beyond 2022**	**Total**
				(Millions)			
Obligations:							
Revolver borrowings	$ —	$ —	$ —	$ —	$ 244	$ —	$ 244
Senior term loans	20	25	35	40	270	—	390
Senior notes	—	—	—	—	—	725	725
Other long term debt (including maturities classified as current)	2	3	—	—	—	—	5
Other subsidiary debt and capital lease obligations	1	3	1	1	1	3	10
Short-term debt	80	—	—	—	—	—	80
Debt and capital lease obligations	103	31	36	41	515	728	1,454
Operating leases	46	36	30	23	18	25	178
Purchase obligations (a)	191	79	—	—	—	—	270
Interest payments	45	60	63	52	209	124	553
Capital commitments	149	—	—	—	—	—	149
Total payments	$ 534	$ 206	$ 129	$ 116	$ 742	$ 877	$ 2,604

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

If we do not maintain compliance with the terms of our senior 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 expect 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 $^{3}/_{8}$ percent and 5 percent, respectively. Interest on our variable rate debt is calculated as LIBOR plus the applicable margin in effect at December 31, 2017 for the Eurodollar and Term Loan A loan and prime plus the applicable margin in effect on December 31, 2017 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, 2017 to complete the projects authorized at December 31, 2017 , in which we have made substantial commitments in connection with purchasing plant, property and equipment for our operations. For 2018, we expect our capital expenditures to be between $380 million and $410 million.

We have included an estimate of the expenditures necessary after December 31, 2017 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 on 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 $15 million to those plans in 2018 . Pension and postretirement contributions beyond 2018 will be required but those amounts will vary based upon many factors, including the performance of our pension fund investments during 2018 and future discount rate changes. For additional information relating to the funding of our pension and other postretirement plans, refer to Note 10 of our 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 $17 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 us to make future payments in the event that the third party primary obligor does not make its required payments. We are 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 our senior credit facility and our senior notes on a joint and several basis. The senior credit facility is also secured by first-priority liens on substantially all our domestic assets and pledges of up to 66 percent of the stock of certain first-tier foreign subsidiaries. No assets or capital stock secure our senior notes. You should also read Note 13 of the consolidated financial statements of Tenneco Inc., where we present the Supplemental Guarantor Consolidating Financial Statements.

We have two performance guarantee agreements in the U.K. between Tenneco Management (Europe) Limited ("TMEL") and the two Walker Group Retirement Plans, the Walker Group Employee Benefit Plan and the Walker Group Executive Retirement Benefit Plan (the "Walker Plans"), whereby TMEL will guarantee the payment of all current and future pension contributions in the event of a payment default by the sponsoring or participating employers of the Walker Plans. The Walker Plans are comprised of employees from Tenneco Walker (U.K.) Limited and Futaba (U.K.) Limited, formerly our Futaba-Tenneco (U.K.) joint venture. Employer contributions are funded by Tenneco Walker (U.K.) Limited, as the sponsoring employer, and were also funded by Futaba (U.K.) Limited prior to its ceasing, on April 28, 2017, to be an entity in which Tenneco has an equity interest. The performance guarantee agreements are expected to remain in effect until all pension obligations for the Walker Plans' sponsoring and participating employers have been satisfied. We did not record an additional liability for this performance guarantee since Tenneco Walker (U.K.) Limited, as the sponsoring employer of the Walker Plans, already recognizes 100 percent of the pension obligation calculated based on U.S. GAAP, for all of the Walker Plans' participating employers on its balance sheet, which was zero and $19 million at December 31, 2017 and December 31, 2016 , respectively. At December 31, 2017 , all pension contributions under the Walker Plans were current for all of the Walker Plans' sponsoring and participating employers.

In June 2011, we entered into an indemnity agreement between TMEL and Futaba Industrial Co. Ltd. (Futaba) which required Futaba to indemnify TMEL for any cost, loss or liability which TMEL may have incurred under the performance guarantee agreements relating to the Futaba-Tenneco U.K. joint venture. The maximum amount reimbursable by Futaba to TMEL under this indemnity agreement was equal to the amount incurred by TMEL under the performance guarantee agreements multiplied by Futaba's shareholder ownership percentage of the Futaba-Tenneco U.K. joint venture. On April 28, 2017, Walker Limited sold its equity interest in the Futaba-Tenneco U.K. joint venture entity to Futaba Industrial Co., Ltd. In connection with the closing of that transaction, this indemnity agreement was terminated and accordingly Futaba no longer has any reimbursement obligations thereunder.

We have issued guarantees through letters of credit in connection with some obligations of our affiliates. As of December 31, 2017 , we have $32 million in letters of credit to support some of our subsidiaries' insurance arrangements, foreign employee benefit programs, environmental remediation activities and cash management and capital requirements.

Critical Accounting Policies and Estimates

We prepare our consolidated financial statements in accordance with accounting principles generally accepted in the United States of America. Preparing our consolidated financial statements in accordance with generally accepted accounting principles requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. The following paragraphs include a discussion of some critical areas where estimates are required.

Revenue Recognition

We recognize revenue for sales to our original equipment and aftermarket customers when title and risk of loss passes to the customers under the terms of our arrangements with those customers, which is usually at the time of shipment from our plants or distribution centers. Generally, in connection with the sale of exhaust systems to certain original equipment manufacturers, we purchase catalytic converters and diesel particulate filters or components thereof including precious metals ("substrates") on behalf of our customers which are used in the assembled system. These substrates are included in our inventory and "passed through" to the customer at our cost, plus a small margin, since we take title to the inventory and are responsible for both the delivery and quality of the finished product. Revenues recognized for substrate sales were $2,187 million, $2,028 million and $1,888 million in 2017 , 2016 and 2015 , respectively. For our aftermarket customers, we provide for promotional incentives and returns at the time of sale. Estimates are based upon the terms of the incentives and historical experience with returns. Certain taxes assessed by governmental authorities on revenue producing transactions, such as value added taxes, are excluded from revenue and recorded on a net basis. Shipping and handling costs billed to customers are included in revenues and the related costs are included in cost of sales in our Statements of Income.

Warranty Reserves

Where we have offered product warranty, we 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. We actively study trends of our warranty claims and take action to improve product quality and minimize warranty claims. 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 impact on our consolidated financial statements.

Engineering, Research and Development

We expense engineering, research, and development costs as they are incurred. Engineering, research, and development expenses were $158 million for 2017 , $154 million for 2016 and $146 million for 2015 , net of reimbursements from our customers. Of these amounts, $21 million in 2017 , $15 million in 2016 and $17 million in 2015 relate to research and development, which includes the research, design, and development of a new unproven product or process. Additionally, $128 million for both 2017 and 2016 and $111 million for 2015 of engineering, research, and development expense relates to engineering costs we incurred for application of existing products and processes to vehicle platforms. The remainder of the expenses in each year relate to improvements and enhancements to existing products and processes. Further, our customers reimburse us for engineering, research, and development costs on some platforms when we prepare prototypes and incur costs before platform awards. Our engineering, research, and development expense for 2017 , 2016 and 2015 has been reduced by $164 million, $137 million and $145 million, respectively, for these reimbursements.

Pre-production Design and Development and Tooling Assets

We expense pre-production design and development costs as incurred unless we have a contractual guarantee for reimbursement from the original equipment customer. Unbilled pre-production design and development costs recorded in prepayments and other and long-term receivables totaled $25 million and $22 million on December 31, 2017 and 2016 , respectively. In addition, plant, property and equipment included $72 million and $62 million at December 31, 2017 and 2016 , respectively, for original equipment tools and dies that we own, and prepayments and other included $117 million and $97 million at December 31, 2017 and 2016 , respectively, for in-process tools and dies that we are building for our original equipment customers.

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. We have included in these financial statements provisional estimates for the deemed repatriation transition tax impact contained within TCJA and provisional measurements for effective rate changes to deferred tax assets and liabilities, including any valuation allowances thereon, as disclosed in the Tax Footnotes. The Company will continue to refine its estimates throughout the measurement period provided for in SEC Staff Accounting Bulletin 118, or until its accounting is complete. 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. Because of the complexities of the provisions, the Company is continuing to evaluate the elective treatment under U.S. generally accepted accounting principles as either a period income tax expense or as a component of deferred taxes.

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.

Goodwill, net

We evaluate goodwill for impairment in the fourth quarter of each year, or more frequently if events indicate it is warranted.

In January 2017, the Financial Accounting Standards Board (“FASB”) issued Accounting Standard Update 2017-04, Intangibles —Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. To address concerns over the cost and complexity of the two-step goodwill impairment test, the new standard removes the second step of the test. An entity will apply a one-step quantitative test and record the amount of goodwill impairment as the excess of a reporting unit's carrying amount over its fair value, not to exceed the total amount of goodwill allocated to the reporting unit. A public business entity should adopt the amendments in this update for its annual or any interim goodwill impairment tests in fiscal years beginning after December 15, 2019. Early adoption is permitted for interim or annual goodwill impairment test performed on testing dates after January 1, 2017. We adopted this standard for the first quarter of 2017.

We compare the estimated fair value of our reporting units with goodwill to the carrying value of the unit’s assets and liabilities to determine if impairment exists within the recorded balance of goodwill. We estimate the fair value of each reporting unit using the income approach which is based on the present value of estimated future cash flows. The income approach is dependent on a number of factors, including estimates of market trends, forecasted revenues and expenses, capital expenditures, weighted average cost of capital and other variables. A separate discount rate derived by a combination of published sources, internal estimates and weighted based on our debt to equity ratio, was used to calculate the discounted cash flows for each of our reporting units. These estimates are based on assumptions that we believe to be reasonable, but which are inherently uncertain and outside of the control of management. If the carrying value of our reporting units exceeds their current fair value as determined based on discounted future cash flows of the related business, the goodwill is considered impaired. As a result, a goodwill impairment loss would be measured at the amount by which a reporting unit's carrying amount exceeds its fair value, not to exceed the carrying amount of goodwill.

As a result of our goodwill impairment evaluation in the fourth quarter of 2017, we determined that the estimated fair value of the Europe and South America Ride Performance reporting unit was lower than its carrying value. Accordingly, we recorded a goodwill impairment charge of $11 million in the fourth quarter. We reached this determination based on updated long-term projections for the Europe and South America Ride Performance reporting unit provided by the Company's annual budgeting and strategic planning process, which is completed in the fourth quarter. The 2017 annual budgeting and strategic planning process indicated that the reporting unit's recovery period will be longer than previously expected. In the fourth quarter of 2017 , the estimated fair value of our other reporting units substantially exceeded the carrying value of their assets and liabilities as of the testing date for goodwill impairment.

At December 31, 2017 , accumulated goodwill impairment charges include $306 million related to our North America Ride Performance reporting unit, $43 million related to our Europe, South America & India Ride Performance reporting unit and $11 million related to our Asia Pacific Ride Performance reporting unit.

In the fourth quarter of 2016 and 2015 , the estimated fair value of each of our reporting units exceeded the carrying value of their assets and liabilities as of the testing date for goodwill impairment.

Pension and Other Postretirement Benefits

We have various defined benefit pension plans that cover some of our employees. We also have postretirement health care and life insurance plans that cover some of our U.S. and Canadian employees. Our pension and postretirement health care and life insurance expenses and valuations are dependent on assumptions used by our actuaries in calculating those amounts. These assumptions include discount rates, health care cost trend rates, long-term return on plan assets, retirement rates, mortality rates and other factors. Health care cost trend rate assumptions are developed based on historical cost data and an assessment of likely long-term trends. Retirement rates are based primarily on actual plan experience while mortality rates are based upon the general population experience which is not expected to differ materially from our experience.

Our approach to establishing the discount rate assumption for both our domestic and foreign plans is generally based on the yield on high-quality corporate fixed-income investments. At the end of each year, the discount rate is determined using the results of bond yield curve models based on a portfolio of high quality bonds matching the notional cash inflows with the expected benefit payments for each significant benefit plan. Based on this approach, we lowered the weighted average discount rate for all our pension plans to 3.0 percent in 2017 from 3.3 percent in 2016 . The discount rate for postretirement benefits was lowered to 3.8 percent in 2017 from 4.2 percent in 2016 .

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 5.5 percent in 2017 from 6.1 percent in 2016 .

Our pension plans generally do not require employee contributions. Our policy is to fund our pension plans in accordance with applicable U.S. and foreign government regulations. At December 31, 2017 , all legal funding requirements had been met.

Refer to Note 10 of our consolidated financial statements for more information regarding our pension and other postretirement employee benefit costs and assumptions.

New Accounting Pronouncements

Note 1 of the consolidated financial statements located in Item 8 — Financial Statements and Supplemental Data is incorporated herein by reference.

Derivative Financial Instruments

Foreign Currency Exchange Rate Risk

We use derivative financial instruments, principally foreign currency forward purchase and sale contracts with terms of less than one year, to hedge a portion of our exposure to changes in foreign currency exchange rates. Our primary exposure to changes in foreign currency rates results from intercompany loans made between affiliates. Additionally, 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. We manage counter-party credit risk by entering into derivative financial instruments with major financial institutions that can be expected to fully perform under the terms of such agreements. We do not enter into derivative financial instruments for speculative purposes.

In managing our foreign currency exposures, we identify and aggregate existing offsetting positions and then hedge residual exposures through third-party derivative contracts. The fair value of our foreign currency forward contracts was a net liability position of less than $1 million at December 31, 2017 and is based on an internally developed model which incorporates observable inputs including quoted spot rates, forward exchange rates and discounted future expected cash flows utilizing market interest rates with similar quality and maturity characteristics. The following table summarizes by major currency the notional amounts for our foreign currency forward purchase and sale contracts as of December 31, 2017 . All contracts in the following table mature in 2018 .

		Notional Amount in Foreign Currency
		(Millions)
British pounds	—Purchase	11
Canadian dollars	—Sell	(2)
European euro	—Sell	(4)
U.S. dollars	—Purchase	7
	—Sell	(15)

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, 2017 , we had $739 million in long-term debt obligations that have fixed interest rates. Of that amount, $500 million is fixed through July 2026, $225 million is fixed through December 2024 and the remainder is fixed through 2025. We also have $637 million in long-term debt obligations that are subject to variable interest rates. 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 that the fair value of our long-term debt at December 31, 2017 was about 102 percent of its book value. A 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 Prices

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. In the second quarter of 2017, we entered into an equity swap agreement with a financial institution. We selectively use cash-settled equity swaps to reduce market risk associated with our deferred 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. As of December 31, 2017 , we had hedged deferred liability related to approximately 250,000 common share equivalents.

Environmental Matters, Legal Proceedings and Product Warranties

Note 12 of the consolidated financial statements located in Part II Item 8 — Financial Statements and Supplemental Data is incorporated herein by reference.

Tenneco 401(k) Retirement Savings 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”). Under the plan, subject to limitations in the Internal Revenue Code, participants may elect to defer up to 75 percent of their salary through contributions to the plan, which are invested in selected mutual funds or used to buy our common stock. We match 100 percent of an employee's contributions up to three percent of the employee's salary and 50 percent of an employee's contributions that are between three percent and five percent of the employee's salary. In connection with freezing the defined benefit pension plans for nearly all U.S. based salaried and non-union hourly employees effective December 31, 2006, and the related replacement of those defined benefit plans with defined contribution plans, we are making additional contributions to the Employee Stock Ownership Plans. We recorded expense for these contributions of approximately $29 million, $28 million and $27 million in 2017 , 2016 , and 2015 , respectively. Matching contributions vest immediately. Defined benefit replacement contributions fully vest on the employee’s third anniversary of employment.

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

The section entitled “Derivative Financial Instruments” in Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations” is incorporated herein by reference.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA.

INDEX TO FINANCIAL STATEMENTS OF TENNECO INC. AND CONSOLIDATED SUBSIDIARIES

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(e) and Rule 15d-15(e) 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, 2017. 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 this assessment, our management identified control deficiencies as of December 31, 2017 which constituted a material weakness.

A material weakness (as defined in Rule 12b-2 under the Exchange Act) is a deficiency, or combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement in our annual or interim financial statements will not be prevented or detected on a timely basis.

During the quarter ended June 30, 2017, the Company identified deficiencies that, when aggregated together, resulted in a material weakness in the Company's internal control over financial reporting in China. The Company did not have people with appropriate authority and experience in key positions in China. Specifically, we did not have adequate international oversight to prevent the intentional mischaracterization of the nature of accounting transactions related to payments received by the Company from suppliers by certain purchasing and accounting personnel at the Company's Chinese subsidiaries.

The material weakness described above resulted in immaterial errors impacting previously issued consolidated financial statements for the years ended December 31, 2016, 2015 and 2014, and each interim and year-to-date period in those respective years. We evaluated these errors and concluded that they did not, individually or in the aggregate, result in a material misstatement of our previously issued consolidated financial statements. However, the identified misstatements resulting from the intentional mischaracterizations discussed above would be material if corrected as an out-of-period adjustment. Additionally, this material weakness could result in the misstatement of the relevant account balances or disclosures that would result in a material misstatement to the annual or interim consolidated financial statements that would not be prevented or detected.

As a result of the material weakness described above, we have concluded that we did not maintain effective internal control over financial reporting as of December 31, 2017.

Our internal control over financial reporting as of December 31, 2017 has been audited by PricewaterhouseCoopers LLP, our independent registered public accounting firm, as stated in their report, which is included herein.

February 28, 2018

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 as of December 31, 2017 and 2016, and the related consolidated statements of income, comprehensive income, changes in shareholders' equity and cash flows for each of the three years in the period ended December 31, 2017, 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, 2017, 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, 2017 and 2016, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2017 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company did not maintain, in all material respects, effective internal control over financial reporting as of December 31, 2017, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO because a material weakness in internal control over financial reporting related to the accounting for payments received by the Company from suppliers by certain purchasing and accounting personnel at the Company's Chinese subsidiaries existed as of that date.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the annual or interim financial statements will not be prevented or detected on a timely basis. The material weakness referred to above is described in the accompanying Management's Report on Internal Control Over Financial Reporting. We considered this material weakness in determining the nature, timing, and extent of audit tests applied in our audit of the 2017 consolidated financial statements, and our opinion regarding the effectiveness of the Company's internal control over financial reporting does not affect our opinion on those consolidated financial statements.

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 management's report referred to above. 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.

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
February 28, 2018

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

TENNECO INC.

CONSOLIDATED STATEMENTS OF INCOME

	Year Ended December 31,		
	2017	**2016**	**2015**
	(Millions Except Share and Per Share Amounts)		
Revenues			
Net sales and operating revenues	$ 9,274	$ 8,599	$ 8,181
Costs and expenses			
Cost of sales (exclusive of depreciation and amortization shown below)	7,812	7,123	6,828
Goodwill impairment charge	11	—	—
Engineering, research, and development	158	154	146
Selling, general, and administrative	648	589	491
Depreciation and amortization of other intangibles	224	212	203
	8,853	8,078	7,668
Other income (expense)			
Loss on sale of receivables	(5)	(5)	(4)
Other income (expense)	1	—	(1)
	(4)	(5)	(5)
Earnings before interest expense, income taxes, and noncontrolling interests	417	516	508
Interest expense	73	92	67
Earnings before income taxes and noncontrolling interests	344	424	441
Income tax expense	70	—	146
Net income	274	424	295
Less: Net income attributable to noncontrolling interests	67	68	54
Net income attributable to Tenneco Inc.	$ 207	$ 356	$ 241
Earnings per share			
Weighted average shares of common stock outstanding —			
Basic	52,796,184	55,939,135	59,678,309
Diluted	53,026,911	56,407,436	60,193,150
Basic earnings per share of common stock	$ 3.93	$ 6.36	$ 4.05
Diluted earnings per share of common stock	$ 3.91	$ 6.31	$ 4.01
Cash dividends declared	$ 1.00	$ —	$ —

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

TENNECO INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

	Year Ended December 31, 2017					
	Tenneco Inc.		Noncontrolling interests		Total	
	Accumulated Other Comprehensive Income (Loss)	Comprehensive Income (Loss)	Accumulated Other Comprehensive Income (Loss)	Comprehensive Income (Loss)	Accumulated Other Comprehensive Income (Loss)	Comprehensive Income (Loss)
	(Millions)					
Net Income		$ 207		$ 67		$ 274
Accumulated Other Comprehensive Income (Loss)						
Cumulative Translation Adjustment						
Balance January 1	$ (338)		$ (5)		$ (343)	
Translation of foreign currency statements, net of tax	97	97	2	2	99	99
Balance December 31	(241)		(3)		(244)	
Adjustment to the Liability for Pension and Postretirement Benefits						
Balance January 1	(327)		—		(327)	
Adjustment to the Liability for Pension and Postretirement benefits, net of tax	27	27	—	—	27	27
Balance December 31	(300)		—		(300)	
Balance December 31	$ (541)		$ (3)		$ (544)	
Other comprehensive income		124		2		126
Comprehensive Income		$ 331		$ 69		$ 400

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

TENNECO INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

	Year Ended December 31, 2016					
	Tenneco Inc.		Noncontrolling interests		Total	
	Accumulated Other Comprehensive Income (Loss)	Comprehensive Income (Loss)	Accumulated Other Comprehensive Income (Loss)	Comprehensive Income (Loss)	Accumulated Other Comprehensive Income (Loss)	Comprehensive Income (Loss)
	(Millions)					
Net Income		$ 356		$ 68		$ 424
Accumulated Other Comprehensive Income (Loss)						
Cumulative Translation Adjustment						
Balance January 1	$ (297)		$ (1)		$ (298)	
Translation of foreign currency statements, net of tax	(41)	(41)	(4)	(4)	(45)	(45)
Balance December 31	(338)		(5)		(343)	
Adjustment to the Liability for Pension and Postretirement Benefits						
Balance January 1	(368)		—		(368)	
Adjustment to the Liability for Pension and Postretirement benefits, net of tax	41	41	—	—	41	41
Balance December 31	(327)		—		(327)	
Balance December 31	$ (665)		$ (5)		$ (670)	
Other comprehensive loss		—		(4)		(4)
Comprehensive Income		$ 356		$ 64		$ 420

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

TENNECO INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

	Year Ended December 31, 2015					
	Tenneco Inc.		Noncontrolling interests		Total	
	Accumulated Other Comprehensive Income (Loss)	Comprehensive Income (Loss)	Accumulated Other Comprehensive Income (Loss)	Comprehensive Income (Loss)	Accumulated Other Comprehensive Income (Loss)	Comprehensive Income (Loss)
	(Millions)					
Net Income		$ 241		$ 54		$ 295
Accumulated Other Comprehensive Income (Loss)						
Cumulative Translation Adjustment						
Balance January 1	$ (166)		$ 3		$ (163)	
Translation of foreign currency statements, net of tax	(131)	(131)	(4)	(4)	(135)	(135)
Balance December 31	(297)		(1)		(298)	
Adjustment to the Liability for Pension and Postretirement Benefits						
Balance January 1	(379)		—		(379)	
Adjustment to the Liability for Pension and Postretirement benefits, net of tax	11	11	—	—	11	11
Balance December 31	(368)		—		(368)	
Balance December 31	$ (665)		$ (1)		$ (666)	
Other comprehensive loss		(120)		(4)		(124)
Comprehensive Income		$ 121		$ 50		$ 171

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

TENNECO INC.

CONSOLIDATED BALANCE SHEETS

	December 31, 2017	December 31, 2016
	(Millions)	
ASSETS		
Current assets:		
Cash and cash equivalents	$ 315	$ 347
Restricted cash	3	2
Receivables —		
Customer notes and accounts, net	1,294	1,272
Other	27	22
Inventories	869	730
Prepayments and other	291	229
Total current assets	2,799	2,602
Other assets:		
Long-term receivables, net	9	9
Goodwill	49	57
Intangibles, net	22	19
Deferred income taxes	204	199
Other	144	103
	428	387
Plant, property, and equipment, at cost	4,008	3,548
Less — Accumulated depreciation and amortization	(2,393)	(2,191)
	1,615	1,357
Total Assets	$ 4,842	$ 4,346
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Short-term debt (including current maturities of long-term debt)	$ 83	$ 90
Accounts payable	1,705	1,501
Accrued taxes	45	39
Accrued interest	14	15
Accrued liabilities	287	285
Other	132	43
Total current liabilities	2,266	1,973
Long-term debt	1,358	1,294
Deferred income taxes	11	7
Pension and postretirement benefits	268	273
Deferred credits and other liabilities	155	139
Commitments and contingencies		
Total liabilities	4,058	3,686
Redeemable noncontrolling interests	42	40
Tenneco Inc. Shareholders' equity:		
Common stock	1	1
Premium on common stock and other capital surplus	3,112	3,098
Accumulated other comprehensive loss	(541)	(665)
Retained earnings (accumulated deficit)	(946)	(1,100)
	1,626	1,334
Less — Shares held as treasury stock, at cost	930	761
Total Tenneco Inc. shareholders' equity	696	573
Noncontrolling interests	46	47
Total equity	742	620

Total liabilities, redeemable noncontrolling interests and equity	$ 4,842	$ 4,346

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

TENNECO INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended December 31,		
	2017	2016	2015
	(Millions)		
Operating Activities			
Net income	$ 274	$ 424	$ 295
Adjustments to reconcile net income to cash provided by operating activities —			
Goodwill impairment charge	11	—	—
Depreciation and amortization of other intangibles	224	212	203
Deferred income taxes	(10)	(80)	(2)
Stock-based compensation	14	14	15
Loss on sale of assets	5	4	4
Changes in components of working capital —			
(Increase) decrease in receivables	31	(215)	(90)
(Increase) decrease in inventories	(96)	(57)	(36)
(Increase) decrease in prepayments and other current assets	(39)	(8)	37
Increase (decrease) in payables	129	114	90
Increase (decrease) in accrued taxes	4	2	(1)
Increase (decrease) in accrued interest	(2)	12	1
Increase (decrease) in other current liabilities	68	26	(10)
Change in long-term assets	(22)	6	3
Change in long-term liabilities	34	33	8
Other	4	(3)	11
Net cash provided by operating activities	629	484	528
Investing Activities			
Proceeds from sale of assets	8	6	4
Proceeds from sale of equity interest	9	—	—
Cash payments for plant, property, and equipment	(394)	(325)	(286)
Cash payments for software related intangible assets	(25)	(20)	(23)
Change in restricted cash	(1)	(1)	2
Other	(10)	—	—
Net cash used by investing activities	(413)	(340)	(303)
Financing Activities			
Cash dividends	(53)	—	—
Retirement of long-term debt	(19)	(531)	(37)
Issuance of long-term debt	137	509	1
Debt issuance costs of long-term debt	(8)	(9)	(1)
Purchase of common stock under the share repurchase program	(169)	(225)	(213)
Issuance (repurchase) of common stock	(1)	13	1
Increase (decrease) in bank overdrafts	(7)	10	(22)
Net increase (decrease) in revolver borrowings and short-term debt excluding current maturities of long-term debt and short-term borrowings secured by accounts receivable	(67)	202	102
Net increase in short-term borrowings secured by accounts receivable	—	—	30
Distribution to noncontrolling interest partners	(64)	(55)	(44)
Net cash used by financing activities	(251)	(86)	(183)
Effect of foreign exchange rate changes on cash and cash equivalents	3	2	(37)
Increase in cash and cash equivalents	(32)	60	5
Cash and cash equivalents, January 1	347	287	282
Cash and cash equivalents, December 31 (Note)	$ 315	$ 347	$ 287
Supplemental Cash Flow Information			
Cash paid during the year for interest	$ 78	$ 76	$ 68
Cash paid during the year for income taxes (net of refunds)	95	113	105

Non-cash Investing and Financing Activities			
Period end balance of trade payables for plant, property, and equipment	$ 59	$ 68	$ 50

Note: Cash and cash equivalents include highly liquid investments with a maturity of three months or less at the date of purchase.

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

TENNECO INC.

CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

	Year Ended December 31,					
	2017		2016		2015	
	Shares	Amount	Shares	Amount	Shares	Amount
	(Millions Except Share Amounts)					
Common Stock						
Balance January 1	65,891,930	$ 1	65,067,132	$ 1	64,454,248	$ 1
Issued pursuant to benefit plans	34,760	—	292,514	—	335,766	—
Restricted shares forfeited	(126,682)	—	—	—	—	—
Stock options exercised	233,501	—	532,284	—	277,118	—
Balance December 31	66,033,509	1	65,891,930	1	65,067,132	1
Premium on Common Stock and Other Capital Surplus						
Balance January 1		3,098		3,081		3,059
Premium on common stock issued pursuant to benefit plans		14		17		22
Balance December 31		3,112		3,098		3,081
Accumulated Other Comprehensive Loss						
Balance January 1		(665)		(665)		(545)
Other comprehensive gain (loss)		124		—		(120)
Balance December 31		(541)		(665)		(665)
Retained Earnings (Accumulated Deficit)						
Balance January 1		(1,100)		(1,456)		(1,697)
Net income attributable to Tenneco Inc.		207		356		241
Cash dividends declared		(53)		—		—
Balance December 31		(946)		(1,100)		(1,456)
Less — Common Stock Held as Treasury Stock, at Cost						
Balance January 1	11,655,938	761	7,473,325	536	3,244,692	323
Purchase of common stock through stock repurchase program	2,936,950	169	4,182,613	225	4,228,633	213
Balance December 31	14,592,888	930	11,655,938	761	7,473,325	536
Total Tenneco Inc. shareholders' equity		$ 696		$ 573		$ 425
Noncontrolling interests:						
Balance January 1		47		39		40
Net income		31		32		22
Other comprehensive loss		(1)		(2)		(3)
Dividends declared		(31)		(22)		(20)
Balance December 31		$ 46		$ 47		$ 39
Total equity		$ 742		$ 620		$ 464

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

TENNECO INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Summary of Accounting Policies

Consolidation and Presentation

Our consolidated financial statements include all majority-owned subsidiaries. We have eliminated intercompany transactions. We have evaluated all subsequent events through the date our financial statements were issued.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. These estimates include, among others, allowances for doubtful receivables, promotional and product returns, income taxes, pension and postretirement benefit plans, and contingencies. These items are covered in more detail in the accompanying Footnotes (See Note 1, Note 7, Note 10, and Note 12). Actual results could differ from those estimates.

Redeemable Noncontrolling Interests

We have noncontrolling interests in five joint ventures with redemption features that could require us to purchase the noncontrolling interests at fair value in the event of a change in control of Tenneco Inc. or certain of our subsidiaries. We do not believe that it is probable that the redemption features in any of these joint venture agreements will be triggered. However, the redemption of these shares is not solely within our control. Accordingly, the related noncontrolling interests are presented as “Redeemable noncontrolling interests” in the temporary equity section of our consolidated balance sheets.

The following is a rollforward of activity in our redeemable noncontrolling interests for the years ending December 31, 2017 , 2016 and 2015 , respectively:

	2017	2016	2015
		(Millions)	
Balance January 1	$ 40	$ 41	$ 34
Net income attributable to redeemable noncontrolling interests	36	36	32
Other comprehensive income (loss)	3	(2)	(1)
Dividends declared	(37)	(35)	(24)
Balance December 31	$ 42	$ 40	$ 41

Inventories

At December 31, 2017 and 2016 , inventory by major classification was as follows:

	2017	2016
	(Millions)	
Finished goods	$ 349	$ 284
Work in process	268	245
Raw materials	178	137
Materials and supplies	74	64
	$ 869	$ 730

Our inventories are stated at the lower of cost or market 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.

Goodwill and Intangibles, net

We evaluate goodwill for impairment in the fourth quarter of each year, or more frequently if events indicate it is warranted.

In January 2017, the Financial Accounting Standards Board (“FASB”) issued Accounting Standard Update 2017-04, Intangibles —Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. To address concerns over the cost and complexity of the two-step goodwill impairment test, the new standard removes the second step of the test. An entity will apply a one-step quantitative test and record the amount of goodwill impairment as the excess of a reporting unit's carrying amount over its fair value, not to exceed the total amount of goodwill allocated to the reporting unit. A public business entity should adopt the amendments in this update for its annual or any interim goodwill impairment tests in fiscal years beginning after December 15, 2019. Early adoption is permitted for interim or annual goodwill impairment test performed on testing dates after January 1, 2017. We adopted this standard in the first quarter of 2017.

We compare the estimated fair value of our reporting units with goodwill to the carrying value of the unit's net assets to determine if a goodwill impairment exists. We estimate the fair value of each reporting unit using the income approach which is based on the present value of estimated future cash flows. The income approach is dependent on a number of factors, including estimates of market trends, forecasted revenues and expenses, capital expenditures, weighted average cost of capital and other variables. A separate discount rate derived by a combination of published sources, internal estimates and weighted based on our debt to equity ratio, was used to calculate the discounted cash flows for each of our reporting units. These estimates are based on assumptions that we believe to be reasonable, but which are inherently uncertain and outside of the control of management. If the carrying value of our reporting units exceeds their current fair value as determined based on discounted future cash flows of the related business, the goodwill is considered impaired. As a result, a goodwill impairment loss would be measured at the amount by which a reporting unit's carrying amount exceeds its fair value, not to exceed the carrying amount of goodwill.

As a result of our goodwill impairment evaluation in the fourth quarter of 2017, we determined that the estimated fair value of the Europe and South America Ride Performance reporting unit was lower than its carrying value. Accordingly, we recorded a goodwill impairment charge of $11 million in the fourth quarter. We reached this determination based on updated long-term projections for the Europe and South America Ride Performance reporting unit provided by the Company's annual budgeting and strategic planning process, which is completed in the fourth quarter. The 2017 annual budgeting and strategic planning process indicated that the reporting unit's recovery period will be longer than previously expected. In the fourth quarter of 2017 , the estimated fair value of our other reporting units substantially exceeded the carrying value of their assets and liabilities as of the testing date for goodwill impairment.

At December 31, 2017 , accumulated goodwill impairment charges include $306 million related to our North America Ride Performance reporting unit, $43 million related to our Europe and South America Ride Performance reporting unit and $11 million related to our Asia Pacific Ride Performance reporting unit.

In the fourth quarter of 2016 and 2015 , the estimated fair value of each of our reporting units exceeded the carrying value of their assets and liabilities as of the testing date for goodwill impairment.

The changes in the net carrying amount of goodwill for the years ended December 31, 2017 , 2016 and 2015 were as follows:

	Clean Air Division			Ride Performance Division			
	North America	Europe and South America	Asia Pacific	North America	Europe and South America	Asia Pacific	Total
			(Millions)				
Balance at December 31, 2015	$ 14	$ 11	$ —	$ 10	$ 11	$ 14	$ 60
Translation Adjustment	—	—	—	—	(3)	—	(3)
Balance at December 31, 2016	14	11	—	10	11	11	57
Translation Adjustment	—	1	—	—	—	2	3
Goodwill Impairment Charge	—	—	—	—	(11)	—	(11)
Balance at December 31, 2017	14	12	—	10	—	13	49

We have capitalized certain intangible assets, primarily technology rights, trademarks and patents, based on their estimated fair value at the date we acquired them. We amortize our finite useful life intangible assets on a straight-line basis over periods ranging from 3 to 50 years. Amortization of intangibles amounted to $3 million in both 2017 and 2016, and $5 million in 2015 , and are included in the statements of income caption "Depreciation and amortization of intangibles." The carrying amount and accumulated amortization of our finite useful life intangible assets were as follows:

	December 31, 2017		December 31, 2016	
	Gross Carrying Value	Accumulated Amortization	Gross Carrying Value	Accumulated Amortization
	(Millions)		(Millions)	
Customer contract	$ 8	$ (5)	$ 8	$ (5)
Patents	1	(1)	1	(1)
Technology rights	29	(23)	29	(21)
Other	15	(2)	9	(1)
Total	$ 53	$ (31)	$ 47	$ (28)

Estimated amortization of intangible assets over the next five years is expected to be $5 million in 2018 , $4 million in 2019 , $4 million in 2020 , $3 million in 2021 and $2 million in 2022 .

Plant, Property, and Equipment, at Cost

At December 31, 2017 and 2016 , plant, property, and equipment, at cost, by major category were as follows:

	2017	2016
	(Millions)	
Land, buildings, and improvements	$ 635	$ 568
Machinery and equipment	2,983	2,638
Other, including construction in progress	390	342
	$ 4,008	$ 3,548

We depreciate these properties excluding land on a straight-line basis over the estimated useful lives of the assets. Useful lives range from 10 to 50 years for buildings and improvements and from 3 to 25 years for machinery and equipment.

Notes and Accounts Receivable and Allowance for Doubtful Accounts

Receivables consist of amounts billed and currently due from customers and unbilled pre-production design and development costs. Short and long-term accounts receivable outstanding were $1,317 million and $1,293 million at December 31, 2017 and 2016 , respectively. The allowance for doubtful accounts on short-term and long-term accounts receivable was $16 million at both December 31, 2017 and 2016. Short and long-term notes receivable outstanding were $2 million and $4 million at December 31, 2017 and 2016 , respectively. The allowance for doubtful accounts on short-term and long-term notes receivable was zero at both December 31, 2017 and 2016 .

Pre-production Design and Development and Tooling Assets

We expense pre-production design and development costs as incurred unless we have a contractual guarantee for reimbursement from the original equipment customer. Unbilled pre-production design and development costs recorded in prepayments and other and long-term receivables were $25 million and $22 million at December 31, 2017 and 2016 , respectively. In addition, plant, property and equipment included $72 million and $62 million at December 31, 2017 and 2016 , respectively, for original equipment tools and dies that we own, and prepayments and other included $117 million and $97 million at December 31, 2017 and 2016 , respectively, for in-process tools and dies that we are building for our original equipment customers.

Internal Use Software Assets

We capitalize certain costs related to the purchase and development of software that we use in our business operations. We amortize the costs attributable to these software systems over their estimated useful lives, ranging from 3 to 12 years, based on various factors such as the effects of obsolescence, technology, and other economic factors. Capitalized software development costs, net of amortization, were $79 million and $66 million at December 31, 2017 and 2016 , respectively, and are recorded in other long-term assets. Amortization of software development costs was approximately $15 million , $12 million and $13 million for the years ended December 31, 2017 , December 31, 2016 , and December 31, 2015 , respectively, and is included in the statements of income (loss) caption “Depreciation and amortization of intangibles.” 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.

Accounts Payable

Accounts payable included $77 million and $99 million at December 31, 2017 and December 31, 2016 , respectively, for accrued compensation and $20 million and $27 million at December 31, 2017 and December 31, 2016 , respectively, for bank overdrafts at our European subsidiaries.

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.

We evaluate our deferred 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 have been established in certain foreign jurisdictions 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 have considered the following possible sources of taxable income when assessing the realization of our deferred tax assets:

- 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 generated by taxable losses in 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.

Revenue Recognition

We recognize revenue for sales to our original equipment and aftermarket customers when title and risk of loss passes to the customers under the terms of our arrangements with those customers, which is usually at the time of shipment from our plants or distribution centers. Generally, in connection with the sale of exhaust systems to certain original equipment manufacturers, we purchase catalytic converters and diesel particulate filters or components thereof including precious metals (“substrates”) on behalf of our customers which are used in the assembled system. These substrates are included in our inventory and “passed through” to the customer at our cost, plus a small margin, since we take title to the inventory and are responsible for both the delivery and quality of the finished product. Revenues recognized for substrate sales were $2,187 million , $2,028 million and $1,888 million in 2017 , 2016 and 2015 , respectively. For our aftermarket customers, we provide for promotional incentives and returns at the time of sale. Estimates are based upon the terms of the incentives and historical experience with returns. Certain taxes assessed by governmental authorities on revenue producing transactions, such as value added taxes, are excluded from revenue and recorded on a net basis. Shipping and handling costs billed to customers are included in revenues and the related costs are included in cost of sales in our consolidated statements of income.

Warranty Reserves

Where we have offered product warranty, we 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. We actively study trends of our warranty claims and take action to improve product quality and minimize warranty claims. 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 impact on our consolidated financial statements.

Earnings Per Share

We compute 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 we adjust 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, we adjust 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. See Note 2 to the consolidated financial statements.

Engineering, Research and Development

We expense engineering, research, and development costs as they are incurred. Engineering, research, and development expenses were $158 million for 2017 , $154 million for 2016 , and $146 million for 2015 , net of reimbursements from our customers. Our customers reimburse us for engineering, research, and development costs on some platforms when we prepare prototypes and incur costs before platform awards. Our engineering, research, and development expense for 2017 , 2016 and 2015 has been reduced by $164 million , $137 million and $145 million , respectively, for these reimbursements.

Advertising and Promotion Expenses

We expense advertising and promotion expenses as they are incurred. Advertising and promotion expenses were $40 million , $40 million , and $54 million for the years ended December 31, 2017 , 2016 , and 2015 , respectively.

Foreign Currency

We translate the consolidated financial statements of foreign subsidiaries into U.S. dollars using the exchange rate at each balance sheet date for assets and liabilities and a weighted-average exchange rate for revenues and expenses in each period. We record translation adjustments for those subsidiaries whose local currency is their functional currency as a component of accumulated other comprehensive income (loss) in shareholders' equity. We recognize transaction gains and losses arising from fluctuations in currency exchange rates on transactions denominated in currencies other than the functional currency in earnings as incurred, except for those intercompany balances which are designated as long-term investments. Our results include foreign currency transaction losses of $4 million in 2017 , gains of $1 million in 2016 and losses of $6 million in 2015 . The amounts are recorded in cost of sales.

We use derivative financial instruments, principally foreign currency forward purchase and sales contracts with terms of less than one year, to hedge our exposure to changes in foreign currency exchange rates. Our primary exposure to changes in foreign currency rates results from intercompany loans made between affiliates to minimize the need for borrowings from third parties. Additionally, 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. We manage counter-party credit risk by entering into derivative financial instruments with major financial institutions that can be expected to fully perform under the terms of such agreements. We do not enter into derivative financial instruments for speculative purposes. In managing our foreign currency exposures, we identify and aggregate existing offsetting positions and then hedge residual exposures through third-party derivative contracts. The fair value of our foreign currency forward contracts was a net liability position of less than $1 million at both December 31, 2017 and December 31, 2016 and is based on an internally developed model which incorporates observable inputs including quoted spot rates, forward exchange rates and discounted future expected cash flows utilizing market interest rates with similar quality and maturity characteristics. We record the change in fair value of these foreign currency forward contracts as part of 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 other current liabilities in the consolidated balance sheet.

New Accounting Pronouncements

In February 2018, the Financial Accounting Standards Board ("FASB") issued Accounting Standard Update 2018-02, Income Statement—Reporting Comprehensive Income (Topic 220). The amendments in this update allow a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act. Consequently, the amendments allow for an election to eliminate the stranded tax effects resulting from the Tax Cuts and Jobs Act 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 Tax Cuts and Jobs Act, 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. We are currently evaluating the potential impact of this new guidance on the Company's consolidated financial statements.

In January 2017, the FASB issued Accounting Standard Update 2017-04, Intangibles —Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. To address concerns over the cost and complexity of the two-step goodwill impairment test, the new standard removes the second step of the test. An entity will apply a one-step quantitative test and record the amount of goodwill impairment as the excess of a reporting unit's carrying amount over its fair value, not to exceed the total amount of goodwill allocated to the reporting unit. A public business entity should adopt the amendments in this update for its annual or any interim goodwill impairment tests in fiscal years beginning after December 15, 2019. Early adoption is permitted for interim or annual goodwill impairment test performed on testing dates after January 1, 2017. We adopted this standard in the first quarter of 2017.

In November 2016, the FASB issued Accounting Standard Update 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. For public business entities, the standard is effective for financial statements issued for annual periods beginning after December 15, 2017, and interim periods within those annual periods. The adoption of this guidance is not expected to have a material impact on the Company's consolidated financial statements.

In October 2016, the FASB issued Accounting Standard Update 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. For public business entities, the standard is effective for financial statements issued for annual periods beginning after December 15, 2017, and interim periods within those annual periods. The adoption of this guidance is not expected to have a material impact on the Company's consolidated financial statements.

In August 2016, the FASB issued Accounting Standard Update 2016-15, Statement of Cash Flows - Classification of certain cash receipts and cash payments (Topic 230). This Update addresses eight specific cash flow issues with the objective of reducing the existing diversity in practice. Current GAAP either is unclear or does not include specific guidance on the eight cash flow classification issues included in the amendments in this update. The amendments are an improvement to GAAP because they provide guidance for each of the eight issues, thereby reducing the current and potential future diversity in practice described above. The amendments in this update are effective for public business entities for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. We will adopt this standard in the first quarter of 2018 and are currently evaluating the materiality of the impact of this new guidance on the Company's consolidated financial statements.

In March 2016, the FASB issued Accounting Standard Update 2016-09, Compensation - Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting, as part of its initiative to reduce complexity in accounting standards. The areas for simplification in this update involve several aspects of the accounting for employee share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, and classification on the statement of cash flows. For public business entities, the standard is effective for financial statements issued for annual periods beginning after December 15, 2016, and interim periods within those annual periods. We adopted this standard in the first quarter of 2017. The impact of the adoption resulted in the following:

- We recorded a tax benefit of $2 million within income tax expense for the year ended December 31, 2017 related to the excess tax benefit on share-based awards. Prior to adoption, this amount would have been recorded as premium on common stock and other capital surplus.
- We no longer reclassify the excess tax benefit from operating activities to financing activities in the statement of cash flows. Cash payments made to the taxing authorities on employees' behalf for withheld shares are presented as financing activities. Tenneco elected to apply this change in presentation retrospectively and thus prior periods have been adjusted.
- We excluded the excess tax benefits from the assumed proceeds available to repurchase shares in the computation of our diluted earnings per share for the quarter ended December 31, 2017 . The impact was not material.

In February 2016, the FASB issued Accounting Standard Update 2016-02, Leases (Topic 842). The amendments in this update create Topic 842, Leases, and supersede the leases requirements in Topic 840, Leases. Topic 842 specifies the accounting for 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. We will adopt this amendment on January 1, 2019. We are currently evaluating the potential impact of this new guidance on the Company's consolidated financial statements.

In May 2014, the FASB issued an amendment on revenue recognition. The amendment in this update creates Topic 606, Revenue from Contracts with Customers, and supersedes the revenue recognition requirements in Topic 605, Revenue

Recognition, including most industry-specific revenue recognition guidance throughout the Industry Topics of the Codification. In addition, the amendment supersedes the cost guidance in Subtopic 605-35, Revenue Recognition-Construction-Type and Production-Type Contracts, and creates new Subtopic 340-40, Other Assets and Deferred Costs-Contracts with Customers. The core principle of Topic 606 is that an entity recognizes revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. The FASB approved a one-year deferral of the effective date from January 1, 2017 to January 1, 2018, while allowing for early adoption as of January 1, 2017 for public entities. We will adopt this amendment on January 1, 2018.

The guidance permits the use of either the retrospective or modified retrospective (cumulative effect) transition method. We adopted the guidance effective January 1, 2018 using the modified retrospective method by recognizing the cumulative effect in equity at the date of initial application.

We have established a cross-functional coordinated team to implement the guidance related to the recognition of revenue from contracts with customers. We are finalizing the process of assessing our customer contracts, identifying contractual provisions that may result in a change in the timing or the amount of revenue recognized in comparison with current guidance, as well as assessing internal controls over financial reporting and the enhanced disclosure requirements of the new guidance. Under current guidance, we generally recognize revenue when products are shipped and risk of loss has transferred to the customer. Under the new requirements, the customized nature of some of our products combined with contractual provisions that provide us with an enforceable right to payment will require us to recognize revenue over time during production. Our findings to date indicate only a small number of our customers provide an enforceable right to payment and therefore would be recognized over time. The cumulative effect in equity at the date of initial application of this change in accounting is not expected to be material. In addition, we have assessed pricing provisions contained in certain of our customer contracts. Certain price adjustments if they are determined to represent an option to purchase additional product at a reduced price could grant a material right to the customer and require a deferral of revenue. While Tenneco pricing provisions contained in customer contracts are generally reflective of market conditions and customary industry pricing practices, some may provide the customer with a material right. Based on our evaluation, no pricing provisions have been considered to represent a material right. We have also evaluated how the new guidance may affect our accounting for contractually guaranteed reimbursements related to customer tooling, engineering services and pre-production costs. Under the current applicable guidance, these customer reimbursements are recorded as cost recovery offsets; whereas under the new standard these guaranteed recoveries may represent consideration from contracts with customers and be recorded as revenues. Our findings indicate these reimbursements are outside the scope of the new accounting standard and thus accounting for such reimbursements is not expected to be impacted.

Restricted Net Assets

In certain countries where we operate, transfers of funds out of such countries by way of dividends, loans or advances are subject to certain central bank restrictions which require approval from the central bank authorities prior to transferring funds out of these countries. The countries in which we operate that have such restrictions include China, South Africa, and Thailand. The net asset balance of our subsidiaries in the countries in which we operate that have such restrictions was \$406 million and \$323 million as of December 31, 2017 and 2016 , respectively. These central banking restrictions do not have a significant effect on our ability to manage liquidity on a global basis.

2. Earnings Per Share

Earnings per share of common stock outstanding were computed as follows:

	Year Ended December 31,		
	2017	2016	2015
	(Millions Except Share and Per Share Amounts)		
Basic earnings per share —			
Net income attributable to Tenneco Inc.	$ 207	$ 356	$ 241
Average shares of common stock outstanding	52,796,184	55,939,135	59,678,309
Earnings per average share of common stock	$ 3.93	$ 6.36	$ 4.05
Diluted earnings per share —			
Net income attributable to Tenneco Inc.	$ 207	$ 356	$ 241
Average shares of common stock outstanding	52,796,184	55,939,135	59,678,309
Effect of dilutive securities:			
Restricted stock	111,062	175,513	96,168
Stock options	119,665	292,788	418,673
Average shares of common stock outstanding including dilutive securities	53,026,911	56,407,436	60,193,150
Earnings per average share of common stock	$ 3.91	$ 6.31	$ 4.01

Options to purchase 834 , 134,361 , and 175,216 shares of common stock were outstanding as of December 31, 2017 , 2016 and 2015 , respectively, but not included in the computation of diluted earnings per share, because the options were anti-dilutive.

3. Acquisitions and divestitures

In November 2015, we closed on the sale of certain assets related to our Marzocchi mountain bike suspension product line to affiliates of Fox Factory Holding Corp.; and in December 2015, we closed on the sale of the Marzocchi motorcycle fork product line to an Italian company, VRM S.p.A. We recorded charges of $29 million in 2015 related to severance and other employee related costs, asset write-downs and other expenses related to the closure.

In March 2016, we completed the disposition of the Gijon, Spain plant and signed an agreement to transfer ownership of the manufacturing facility in Gijon to German private equity fund Quantum Capital Partners A.G. (QCP). The transfer to QCP was effective March 31, 2016 and under a three year manufacturing agreement, QCP will also continue as a supplier to Tenneco.

In April 2017, we sold our 49% equity interest in the Futaba-Tenneco U.K. joint venture entity which produces stamped metal parts to our partner in that joint venture, Futaba Industrial Co., Ltd.

In June 2017, we announced the closing of our Clean Air manufacturing plant in O'Sullivan Beach, Australia when General Motors and Toyota end vehicle production in the country, which occurred in October 2017. All related activities are expected to be completed by the first quarter of 2018.

4. Restructuring and Other Charges

Over the past several years, we have adopted plans to restructure portions of our operations. These plans were approved by our Board of Directors and were designed to reduce operational and administrative overhead costs throughout the business. In 2015, we incurred $63 million in restructuring and related costs including asset write-downs of $10 million , primarily related to European cost reduction efforts, exiting the Marzocchi suspension business, headcount reductions in Australia and South America, and the closure of a JIT plant in Australia, of which $46 million was recorded in cost of sales, $11 million in SG&A, $1 million in engineering expense, $4 million in depreciation and amortization expense and $1 million in other expense. In 2016, we incurred $36 million in restructuring and related costs including asset write-downs of $6 million , primarily related to manufacturing footprint improvements in North America Ride Performance, headcount reduction and cost improvement initiatives in Europe and China Clean Air, South America and Australia, of which $17 million was recorded in cost of sales, $12 million in SG&A, $1 million in engineering, $2 million in other expense and $4 million in depreciation and amortization expense. In 2017, we incurred $72 million in restructuring and related costs including asset write-downs of $3 million , primarily related to the planned closing a Clean Air Belgian JIT plant in response to the end of production on a customer platform, closing an OE Clean Air manufacturing plant and downsizing Ride Performance operations in Australia, the required relocation of our Beijing Ride Performance plant outside of the Beijing area and other cost improvement initiatives, of which $41 million was recorded in cost of sales, $28 million in SG&A and $3 million in depreciation and amortization expense.

Amounts related to activities that are part of our restructuring plans are as follows:

	December 31, 2016 Restructuring Reserve	2017 Expenses	2017 Cash Payments	Impact of Exchange Rates	December 31, 2017 Restructuring Reserve
			(Millions)		
Employee Severance, Termination Benefits and Other Related Costs	$ 15	49	(41)	2	$ 25

On January 31, 2013, we announced our intent to reduce structural costs in Europe by approximately $60 million annually. During the first quarter of 2016, we reached an annualized run rate on this cost reduction initiative of $49 million . With the disposition of the Gijon plant, which was completed at the end of the first quarter of 2016, the annualized rate essentially reached our target of $55 million , at the current exchange rates at that time. In 2015, we incurred $63 million in restructuring and related costs, of which $22 million was related to this initiative. In 2016, we incurred $36 million in restructuring and related costs, of which $20 million was related to this initiative and certain ongoing matters. For example, we closed a plant in Gijon Spain in 2013, but subsequently re-opened it in July 2014 with about half of its prior workforce after the employees' works council successfully filed suit challenging the closure decision. Pursuant to an agreement we entered into with employee representatives, we engaged in a sales process for the facility. In March of 2016, we signed an agreement to transfer ownership of the aftermarket shock absorber manufacturing facility in Gijon, Spain to German private equity fund Quantum Capital Partners A.G. (QCP). The transfer to QCP was effective March 31, 2016 and under a three year manufacturing agreement, QCP will also continue as a supplier to Tenneco.

On July 22, 2015, we announced our intention to discontinue our Marzocchi motorcycle fork suspension product line and our mountain bike suspension product line, and liquidate our Marzocchi operations. These actions were subject to a consultation process with the employee representatives and in total eliminated approximately 138 jobs. We employed 127 people at the Marzocchi plant in Bologna, Italy and an additional 11 people in our operations in North America and Taiwan. In November 2015, we closed on the sale of certain assets related to our Marzocchi mountain bike suspension product line to the affiliates of Fox Factory Holding Corp.; and in December 2015, we closed on the sale of the Marzocchi motorcycle fork product line to an Italian company, VRM S.p.A. These actions were a part of our ongoing efforts to optimize our Ride Performance product line globally while continuously improving our operations and increasing profitability. We recorded charges of $29 million in 2015 related to severance and other employee related costs, asset write-downs and other expenses related to the closure.

On June 29, 2017, we announced a restructuring initiative to close our Clean Air manufacturing plant in O'Sullivan Beach, Australia and downsize our Ride Performance plant in Clovelly Park, Australia when General Motors and Toyota end vehicle production in the country, which occurred in October 2017. All such restructuring activities related to this initiative are expected to be completed by the first quarter of 2018. We 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 2017, we continued the relocation of production out of our Ride Performance plant in Beijing for which we incurred $6 million of restructuring and related costs. In the first quarter of 2017, we recognized a $10 million charge, including asset write-downs of $1 million , related to the planned closing of our Clean Air JIT plant in Ghent, Belgium due to the scheduled end of production on a customer platform in 2020. We incurred an additional $35 million in restructuring and related costs for cost improvement initiatives at various other operations around the world.

Under the terms of our senior credit agreement that took effect on May 12, 2017, we are allowed to exclude, at our discretion, (i) up to $35 million in 2017 and $25 million each year thereafter of cash restructuring charges and related expenses, with the ability to carry forward any amount not used in one year to the next following year, and (ii) up to $150 million in the aggregate of all costs, expenses, fees, fines, penalties, judgments, legal settlements and other amounts associated with any restructuring, litigation, claim, proceeding or investigation related to or undertaken by us or any of our subsidiaries, together with any related provision for taxes, incurred in quarterly period ending after May 12, 2017 in the calculation of the financial covenant ratios required under our senior credit facility. As of December 31, 2017 , we had elected not to exclude any of the $185 million of allowable cash charges and related expenses recognized in 2017 for restructuring related costs and antitrust settlement against the $35 million annual limit for 2017 or the $150 million aggregate limit under the terms of the senior credit facility.

5. Long-Term Debt, Short-Term Debt, and Financing Arrangements

Long-Term Debt

A summary of our long-term debt obligations at December 31, 2017 and 2016 , is set forth in the following table:

	2017	2016
	(Millions)	
Tenneco Inc. —		
Revolver borrowings due 2019, average effective interest rate 2.3% in 2016	$ —	$ 300
Revolver borrowings due 2022, average effective interest rate 3.8% in 2017	244	
Senior Tranche A Term Loan due 2017 through 2020, average effective interest rate 2.2% in 2016	—	270
Senior Tranche A Term Loan due 2017 through 2022, average effective interest rate 2.9% in 2017	390	—
5 3/8% Senior Notes due 2024	225	225
5% Senior Notes due 2026	500	500
Other subsidiaries —		
Other Long Term Debt due in 2020, average interest rate 1.7% in 2017 and 2016	5	7
Notes due 2018 through 2028, average effective interest rate 0.3% in 2017 and 0.2% in 2016	10	8
	1,374	1,310
Less — maturities classified as current	3	3
unamortized debt issuance costs	13	13
Total long-term debt	$ 1,358	$ 1,294

The aggregate maturities applicable to the long-term debt outstanding at December 31, 2017 , are $23 million , $31 million , $36 million , $41 million and $515 million for 2018, 2019, 2020, 2021 and 2022, respectively.

We have excluded the required payments, within the next twelve months, under the Tranche A Term Facility totaling $20 million from current liabilities as of December 31, 2017 , because we have the intent and ability to refinance the obligations on a long-term basis by using our revolving credit facility.

Short-Term Debt

Our short-term debt includes the current portion of long-term obligations and borrowings by parent company and foreign subsidiaries. Information regarding our short-term debt as of and for the years ended December 31, 2017 and 2016 is as follows:

	2017	2016
	(Millions)	
Maturities classified as current	$ 3	$ 3
Short-term borrowings	80	87
Total short-term debt	$ 83	$ 90

	Notes Payable(a)	
	2017	2016
	(Dollars in Millions)	
Outstanding borrowings at end of year	$ 80	$ 87
Weighted average interest rate on outstanding borrowings at end of year(b)	2.9%	2.8%
Maximum month-end outstanding borrowings during year	$ 205	$ 193
Average month-end outstanding borrowings during year	$ 186	$ 177
Weighted average interest rate on average month-end outstanding borrowings during year(b)	2.7%	2.4%

(a) Includes borrowings under both committed credit facilities and uncommitted lines of credit and similar arrangements.

(b) This calculation does not include the commitment fees to be paid on the unused revolving credit facility balances which are recorded as interest expense for accounting purposes.

Financing Arrangements

	Committed Credit Facilities(a) as of December 31, 2017				
	Term	Commitments	Borrowings	Letters of Credit(b)	Available
			(Millions)		
Tenneco Inc. revolving credit agreement	2022	$ 1,600	$ 244	$ —	$ 1,356
Tenneco Inc. tranche A term facility	2022	390	390	—	—
Subsidiaries' credit agreements	2018-2028	239	95	—	144
		$ 2,229	$ 729	$ —	$ 1,500

(a) We generally are 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.

Overview. Our financing arrangements are primarily provided by a committed senior secured financing arrangement with a syndicate of banks and other financial institutions. The arrangement is secured by substantially all our domestic assets and pledges of up to 66 percent of the stock of certain first-tier foreign subsidiaries, as well as guarantees by our material domestic subsidiaries.

On June 6, 2016, we announced a cash tender offer to purchase our outstanding $500 million 6 ^{7}/8 percent senior notes due in 2020. We received tenders representing $325 million aggregate principal amount of the notes and, on June 13, 2016, we purchased the tendered notes at a price of 103.81 percent of the principal amount, plus accrued and unpaid interest. On July 13, 2016, we redeemed the remaining outstanding $175 million aggregate principal amount of the notes that were not purchased pursuant to the tender offer at a price of 103.438 percent of the principal amount, plus accrued and unpaid interest. We used the proceeds of the issuance of our 5 percent senior notes due 2026 to fund the purchase and redemption. The senior credit facility was used to fund the fees and expenses of the tender offer and redemption.

We recorded $16 million and $8 million of pre-tax interest charges in June and July of 2016, respectively, related to the repurchase and redemption of our 6 ^{7}/8 percent senior notes due in 2020 and the write-off of deferred debt issuance costs relating to those notes.

On May 12, 2017, we completed a refinancing of our senior credit facility by entering into an amendment and restatement of that facility. The amended and restated credit agreement enhances financial flexibility by increasing the size and extending the term of its revolving credit facility and term loan facility, and by adding Tenneco Automotive Operating Company Inc. as a co-borrower under the revolver credit facility. The amended and restated credit agreement also adds foreign currency borrowing capability and permits the joinder of our foreign and domestic subsidiaries as borrowers under the revolving credit facility in the future. If any foreign subsidiary of Tenneco 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 Tenneco in the chain of ownership of such foreign borrower. The amended and restated credit facility consists of a $1,600 million revolving credit facility and a $400 million term loan A facility, which replaced our former $1,200 million revolving credit facility and $264 million term loan A facility, respectively. As of December 31, 2017 , the senior credit facility provides us with a total revolving credit facility of $1,600 million and had a $390 million balance outstanding under the term loan A facility, both of which will mature on May 12, 2022. Net carrying amount for the balance outstanding under the term loan A facility including a $2 million debt issuance cost was $388 million as of December 31, 2017 . Funds may be borrowed, repaid and re-borrowed under the revolving credit facility without premium or penalty (subject to any customary LIBOR breakage fees). The revolving credit facility is reflected as debt on our balance sheet only if we borrow money under this facility or if we use the facility to make payments for letters of credit. Outstanding letters of credit reduce our availability to borrow revolving loans under the facility. We are required to make quarterly principal payments under the term loan A facility of $5 million through June 30, 2019, $7.5 million beginning September 30, 2019 through June 30, 2020, $10 million beginning September 30, 2020 through March 31, 2022 and a final payment of $260 million is due on May 12, 2022. We have excluded the required payments, within the next twelve months, under the term loan A facility totaling $20 million from current liabilities as of December 31, 2017 , because we have the intent and ability to refinance the obligations on a long-term basis by using our revolving credit facility.

We recorded $1 million of pre-tax interest charges in May 2017 related to amendment and restatement of the senior credit facility and the write off of deferred debt issuance costs related to the senior credit facility.

At December 31, 2017 , of the $1,600 million available under the revolving credit facility, we had unused borrowing capacity of $1,356 million with $244 million in outstanding borrowings and zero in outstanding letters of credit. As of December 31, 2017 , our outstanding debt also included (i) $390 million of a term loan which consisted of a $388 million net carrying amount including a $2 million debt issuance cost related to our Tranche A Term Facility which is subject to quarterly principal payments as described above through December 8, 2019, (ii) $225 million of notes which consisted of a $222 million net carrying amount including a $3 million debt issuance cost of 5 3/8 percent senior notes due December 15, 2024, (iii) $500 million of notes which consisted of a $492 million net carrying amount including an $8 million debt issuance cost of 5 percent senior notes due July 15, 2026, and (iv) $95 million of other debt.

Senior Credit Facility — Interest Rates and Fees. Beginning May 12, 2017, our term loan A facility and revolving credit facility bear interest at an annual rate equal to, at our option, either (i) London Interbank Offered Rate ("LIBOR") plus a margin of 175 basis points, or (ii) a rate consisting of the greater of (a) the JPMorgan Chase prime rate plus a margin of 75 basis points, (b) the Federal Funds rate plus 50 basis points plus a margin of 75 basis points, and (c) one month LIBOR plus 100 basis points plus a margin of 75 basis points. The margin we pay on these borrowings will be increased by a total of 25 basis points above the original margin following each fiscal quarter for which our consolidated net leverage ratio is equal to or greater than 2.5. In addition, the margin we pay on these borrowings will be reduced by a total of 25 basis points below the original margin if our consolidated net leverage ratio is less than 1.5. We also pay a commitment fee equal to 25 basis points that will be reduced to 20 basis points or increased to up to 30 basis points depending on consolidated net leverage ratio changes as set forth in the senior credit facility.

Senior Credit Facility — Other Terms and Conditions. Our senior credit facility requires that we maintain financial ratios equal to or better than the following consolidated net leverage ratio (consolidated indebtedness plus, without duplication, the domestic receivable program amount, net of unrestricted cash and cash equivalents up to $250 million , divided by consolidated EBITDA, each as defined in the senior credit facility agreement), and consolidated interest coverage ratio (consolidated EBITDA divided by consolidated interest expense, as defined in the senior credit facility agreement) at the end of each period indicated. Failure to maintain these ratios will result in a default under our senior credit facility. The financial ratios required under the amended and restated senior credit facility and the actual ratios we calculated for the four quarters of 2017, are as follows:

	Quarter Ended							
	December 31, 2017		September 30, 2017		June 30, 2017		March 31, 2017	
	Req.	Act.	Req.	Act.	Req.	Act.	Req.	Act.
Leverage Ratio (maximum)	3.50	1.95	3.50	2.15	3.50	1.97	3.50	1.62
Interest Coverage Ratio (minimum)	2.75	10.77	2.75	11.48	2.75	12.44	2.75	15.38

The senior credit facility includes a maximum leverage ratio covenant of 3.50 and a minimum interest coverage ratio of 2.75 in each case through May 12, 2022. The amended and restated senior credit facility provides us with the flexibility not to exclude certain otherwise excludable charges incurred in any relevant period from the calculation of the leverage and interest coverage ratios for such period. As of December 31, 2017 , we elected not to exclude a total of $185 million of excludable charges. Had these charges been excluded, the leverage ratio and the interest ratio would have been 1.52 and 13.76 , respectively, as of December 31, 2017 .

The covenants in our senior credit facility agreement generally prohibit us from repaying or refinancing our senior notes. So long as no default existed, we would, however, under our senior credit facility agreement, be permitted to repay or refinance our senior notes (i) with the net cash proceeds of permitted refinancing indebtedness (as defined in the senior credit facility agreement) or with the net cash proceeds of our common stock, in each case issued within 180 days prior to such repayment; (ii) with the net cash proceeds of the incremental facilities (as defined in the senior credit facility agreement) and certain indebtedness incurred by our foreign subsidiaries; (iii) with the proceeds of the revolving loans (as defined in the senior credit facility agreement); (iv) with the cash generated by our operations; (v) in an amount equal to the net cash proceeds of qualified capital stock (as defined in the senior credit facility agreement) issued by us after May 12, 2017; and (vi) in exchange for permitted refinancing indebtedness or in exchange for shares of our common stock; provided that such purchases are capped as follows (with respect to clauses (iii), (iv) and (v) based on a pro forma consolidated leverage ratio after giving effect to such purchase, cancellation or redemption):

Pro forma Consolidated Leverage Ratio	Aggregate Senior Note Maximum Amount	
	(Millions)	
Greater than or equal to 3.25x	$	20
Greater than or equal to 3.0x	$	100
Greater than or equal to 2.5x	$	225
Less than 2.5x		no limit

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

As of December 31, 2017 , we were in compliance with all the financial covenants and operational restrictions of the senior credit facility. Our senior credit facility does not contain any terms that could accelerate payment of the facility or affect pricing under the facility as a result of a credit rating agency downgrade.

Senior Notes. As of December 31, 2017 , our outstanding senior notes included $225 million of 5 $^{3}/_{8}$ percent senior notes due December 15, 2024 which consisted of $222 million net carrying amount including a $3 million debt issuance cost and $500 million of 5 percent senior notes due July 15, 2026 which consisted of $492 million net carrying amount including a $8 million debt issuance cost. Under the indentures governing the notes, we are permitted to redeem some or all of the remaining senior notes at specified prices that decline to par over a specified period, (a) on or after July 15, 2021, in the case of the senior notes due 2026 and (b) on or after December 15, 2019, in the case of the senior notes due 2024. In addition, the notes may also be redeemed at a price generally equal to 100 percent of the principal amount thereof plus a premium based on the present values of the remaining payments due to the note holders. Further, the indentures governing the notes also permit us to redeem up to 35 percent with the proceeds of certain equity offerings (a) on or before July 15, 2019 at a redemption price equal to 105 percent, in the case of the senior notes due 2026 and (b) on or before December 15, 2017 at a redemption price equal to 105.375 percent in the case of the senior notes due 2024. If we sell certain of our assets or experience specified kinds of changes in control, we must offer to repurchase the notes due 2024 and 2026 at 101 percent of the principal amount thereof plus accrued and unpaid interest.

Our senior notes due December 15, 2024 and July 15, 2026, respectively, contain covenants that will, among other things, limit our ability to create liens and enter into sale and leaseback transactions. Our senior notes due 2024 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 our operations, including limitations on: (i) incurring additional indebtedness; (ii) 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 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, 2017 , we were in compliance with the covenants and restrictions of these indentures.

Accounts Receivable Securitization/Factoring. We securitize or factor some of our accounts receivable on a limited recourse basis in the U.S. and Europe. As servicer under these accounts receivable securitization and factoring programs, we are responsible for performing all accounts receivable administration functions for these securitized and factored financial assets including collections and processing of customer invoice adjustments. In the U.S., we have an accounts receivable securitization program with three commercial banks comprised of a first priority facility and a second priority facility. We securitize original equipment and aftermarket receivables on a daily basis under this program. In April 2017, this U.S. program was amended and extended to April 30, 2019. The first priority facility now provides financing of up to $155 million and the second priority facility, which is subordinated to the first priority facility, now provides up to an additional $25 million of financing. Both facilities monetize accounts receivable generated in the U.S. and Canada that meet certain eligibility requirements and the second priority facility also monetizes certain accounts receivable generated in the U.S. and Canada that would otherwise be 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 both December 31, 2017 and 2016.

Each facility contains customary covenants for financings of this type, including restrictions related to liens, payments, mergers or consolidations and amendments to the agreements underlying the receivables pool. Further, each facility may be terminated upon the occurrence of customary events (with customary grace periods, if applicable), including breaches of covenants, failure to maintain certain financial ratios, inaccuracies of representations and warranties, bankruptcy and insolvency events, certain changes in the rate of default or delinquency of the receivables, a change of control and the entry or other enforcement of material judgments. In addition, each facility contains cross-default provisions, where the facility could be terminated in the event of non-payment of other material indebtedness when due and any other event which permits the acceleration of the maturity of material indebtedness.

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 one 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 $107 million at December 31, 2017 .

We also factor receivables in our European operations with regional banks in Europe under various separate 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 $218 million and $160 million at December 31, 2017 and December 31, 2016 , respectively.

If we were not able to securitize or factor receivables under either the U.S or European programs, our borrowings under our revolving credit agreement might increase. These accounts receivable securitization and 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.

In our U.S. accounts receivable securitization programs, we transfer a partial interest in a pool of receivables and the interest that we retain is subordinate to the transferred interest. Accordingly, we account for our U.S. securitization program as a secured borrowing. In our U.S and European accounts receivable factoring programs, we transfer accounts receivables in their entirety to the acquiring entities and satisfy all of the conditions established under ASC Topic 860, “Transfers and Servicing,” to report the transfer of financial assets in their entirety as a sale. The fair value of assets received as proceeds in exchange for the transfer of accounts receivable under our U.S. and European factoring programs approximates the fair value of such receivables. We recognized $4 million in interest expense for the year ended 2017 , $3 million in interest expense for the year ended 2016 and $2 million in interest expense for the year ended 2015 relating to our U.S. securitization program. In addition, we recognized a loss of $3 million for each of the years ended 2017 , 2016 and 2015 , on the sale of trade accounts receivable in our U.S. and European accounts receivable factoring programs, representing the discount from book values at which these receivables were sold to our banks. The discount rate varies based on funding costs incurred by our banks, which averaged approximately one percent for the year ended 2017 and two percent for both years ended 2016 and 2015 .

6. Financial Instruments

The carrying and estimated fair values of our financial instruments by class at December 31, 2017 and 2016 were as follows:

	December 31, 2017		December 31, 2016	
	Carrying Amount	Fair Value	Carrying Amount	Fair Value
	(Millions)			
Long-term debt (including current maturities)	$ 1,361	$ 1,398	$ 1,297	$ 1,311
Equity swap agreement and foreign currency forward contracts:				
Asset derivative contracts (a)	4	4	—	—

(a) All derivatives are categorized within Level 2 of the fair value hierarchy.

Asset and Liability Instruments — The fair value of cash and cash equivalents, short and long-term receivables, accounts payable, and short-term debt was considered to be the same as or was not determined to be materially different from the carrying amount.

Long-term Debt — The fair value of our public fixed rate senior notes is based on quoted market prices. The fair value of our private borrowings under our senior credit facility and other long-term debt instruments is based on the market value of debt with similar maturities, interest rates and risk characteristics. The fair value of our level 1 debt, as classified in the fair value hierarchy, was $749 million and $725 million at December 31, 2017 and December 31, 2016 , respectively. We have classified $634 million and $571 million as level 2 in the fair value hierarchy at December 31, 2017 and December 31, 2016 , respectively, since we utilize valuation inputs that are observable both directly and indirectly. We classified the remaining $15 million , consisting of foreign subsidiary debt, as level 3 in the fair value hierarchy at both December 31, 2017 , and December 31, 2016 .

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 our own assumptions.

Foreign currency forward contracts — We use derivative financial instruments, principally foreign currency forward purchase and sales contracts with terms of less than one year, to hedge a portion of our exposure to changes in foreign currency exchange rates. Our primary exposure to changes in foreign currency rates results from intercompany loans made between affiliates. Additionally, 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. We manage counter-party credit risk by entering into derivative financial instruments with major financial institutions that can be expected to fully perform under the terms of such agreements. We do not enter into derivative financial instruments for speculative purposes. The fair value of our foreign currency forward contracts is based on an internally developed model which incorporates observable inputs including quoted spot rates, forward exchange rates and discounted future expected cash flows utilizing market interest rates with similar quality and maturity characteristics. We record the change in fair value of these foreign currency forward contracts as part of 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 other current liabilities in the consolidated balance sheet. The fair value of our foreign currency forward contracts was a net liability position of less than $1 million at both December 31, 2017 and December 31, 2016 .

The following table summarizes by major currency the notional amounts for foreign currency forward purchase and sale contracts as of December 31, 2017 (all of which mature in 2018):

		Notional Amount in Foreign Currency (Millions)
British pounds	—Purchase	11
Canadian dollars	—Sell	(2)
European euro	—Sell	(4)
U.S. dollars	—Purchase	7
	—Sell	(15)

Cash-settled Share Swap Transactions — In the second quarter of 2017, we entered into an equity swap agreement with a financial institution. We selectively use cash-settled share swaps to reduce market risk associated with our deferred 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 stated amount. As of December 31, 2017 , we had hedged our deferred liability related to approximately 250,000 common share equivalents. The fair value of the equity swap agreement is recorded in other current assets in the consolidated balance sheet. The fair value of our equity swap agreement was a net asset position of $4 million at December 31, 2017 .

Guarantees — 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 our senior credit facility and our senior notes on a joint and several basis. The arrangement for the senior credit facility is also secured by first-priority liens on substantially all our domestic assets and pledges of up to 66 percent of the stock of certain first-tier foreign subsidiaries. No assets or capital stock secure our senior notes. For additional information, refer to Note 13 of the consolidated financial statements of Tenneco Inc., where we present the Supplemental Guarantor Condensed Consolidating Financial Statements.

We have two performance guarantee agreements in the U.K. between Tenneco Management (Europe) Limited ("TMEL") and the two Walker Group Retirement Plans, the Walker Group Employee Benefit Plan and the Walker Group Executive Retirement Benefit Plan (the "Walker Plans"), whereby TMEL will guarantee the payment of all current and future pension contributions in event of a payment default by the sponsoring or participating employers of the Walker Plans. The Walker Plans are comprised of employees from Tenneco Walker (U.K.) Limited, formerly our Futaba-Tenneco (U.K.) joint venture. Employer contributions are funded by Tenneco Walker (U.K.) Limited, as the sponsoring employer, and were also funded by Futaba (U.K.) Limited prior to its ceasing, on April 28, 2017, to be an entity in which Tenneco has an equity interest. The performance guarantee agreements are expected to remain in effect until all pension obligations for the Walker Plans' sponsoring and participating employers have been satisfied. We did not record an additional liability for this performance guarantee since Tenneco Walker (U.K.) Limited, as the sponsoring employer of the Walker Plans, already recognizes 100 percent of the pension obligation calculated based on U.S. GAAP, for all of the Walker Plans' participating employers on its balance sheet, which was zero and $19 million at December 31, 2017 and December 31, 2016 , respectively. At December 31, 2017 , all pension contributions were current for all of the Walker Plans' sponsoring and participating employers.

In June 2011, we entered into an indemnity agreement between TMEL and Futaba Industrial Co. Ltd. which required Futaba to indemnify TMEL for any cost, loss or liability which TMEL may incur under the performance guarantee agreements relating to the Futaba-Tenneco U.K. joint venture. The maximum amount reimbursable by Futaba to TMEL under this indemnity agreement is equal to the amount incurred by TMEL under the performance guarantee agreements multiplied by Futaba's shareholder ownership percentage of the Futaba-Tenneco U.K. joint venture. On April 28, 2017, Walker Limited sold its equity interest in the Futaba-Tenneco U.K. joint venture entity to Futaba Industrial Co., Ltd. In connection with the closing of that transaction, this indemnity agreement was terminated and accordingly Futaba no longer has any reimbursement obligations thereunder.

We have issued guarantees through letters of credit in connection with some obligations of our affiliates. As of December 31, 2017 , we have guaranteed $32 million in letters of credit to support some of our subsidiaries' insurance arrangements, foreign employee benefit programs, environmental remediation activities and cash management and capital requirements.

Financial Instruments — In certain instances, several of our Chinese subsidiaries receive payment from customers through the receipt of financial instruments on the date the customer payments are due. Several of our Chinese subsidiaries also satisfy vendor payments through the delivery of financial instruments on the date the payments are due. Financial instruments issued to satisfy vendor payables and not redeemed totaled $11 million and $12 million at December 31, 2017 and December 31, 2016 , respectively, and were classified as notes payable. Financial instruments received from OE customers and not redeemed totaled $10 million and $5 million at December 31, 2017 and December 31, 2016 , respectively. We classify financial instruments received from our customers as other current assets if issued by a financial institution of our customers or as customer notes and accounts, net if issued by our customer. We classified $10 million and $5 million in other current assets at December 31, 2017 and December 31, 2016 , respectively.

The financial instruments received by some of our Chinese subsidiaries are drafts drawn that are payable at a future date and, in some cases, are negotiable and/or are guaranteed by the banks of the customers. The use of these instruments for payment follows local commercial practice. Because certain of such financial instruments are guaranteed by our customers' banks, we believe they represent a lower financial risk than the outstanding accounts receivable that they satisfy which are not guaranteed by a bank.

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

Restricted Cash - Some of our Chinese subsidiaries that issue their own financial instruments to pay vendors are required to maintain a cash balance if they exceed credit limits with the financial institution that guarantees the financial instruments. A restricted cash balance was required at those Chinese subsidiaries for $2 million at both December 31, 2017 and December 31, 2016 .

One of our subsidiaries in Brazil and another in Spain are required by law to maintain a cash deposit with a financial institution to guarantee the maximum estimated loss related to a tax audit until a settlement is reached. The cash deposit required was $1 million at December 31, 2017 .

7. Income Taxes

The domestic and foreign components of our income before income taxes and noncontrolling interests are as follows:

	Year Ended December 31,		
	2017	2016	2015
		(Millions)	
U.S. income (loss) before income taxes	$ (25)	$ 63	$ 198
Foreign income before income taxes	369	361	243
Income before income taxes and noncontrolling interests	$ 344	$ 424	$ 441

Following is a comparative analysis of the components of income tax expense (benefit):

	Year Ended December 31,		
	2017	2016	2015
		(Millions)	
Current —			
U.S. federal	$ (24)	$ (9)	$ 64
State and local	1	4	5
Foreign	101	85	83
	78	80	152
Deferred —			
U.S. federal	13	(91)	(1)
State and local	(3)	(1)	1
Foreign	(18)	12	(6)
	(8)	(80)	(6)
Income tax expense	$ 70	$ —	$ 146

Following is a reconciliation of income taxes computed at the statutory U.S. federal income tax rate (35 percent for all years presented) to the income tax expense reflected in the statements of income:

	Year Ended December 31,		
	2017	2016	2015
		(Millions)	
Income tax expense computed at the statutory U.S. federal income tax rate	$ 120	$ 148	$ 154
Increases (reductions) in income tax expense resulting from:			
Foreign income taxed at different rates	(48)	(42)	(14)
Transition Tax under Tax Cuts and Jobs Act ("TCJA")	43	—	—
Re-measurement of Worldwide Deferred Taxes	48	—	(4)
State and local taxes on income, net of U.S. federal income tax benefit	(2)	3	11
Changes in valuation allowance for tax loss carryforwards and credits	(1)	18	13
Foreign tax holidays	—	—	(7)
Investment and R&D tax credits	(6)	(6)	(26)
Foreign earnings subject to U.S. federal income tax	(74)	(101)	12
Adjustment of prior years taxes	—	—	2
Tax contingencies	(1)	(7)	4
Other	(9)	(13)	1
Income tax expense	$ 70	$ —	$ 146

We reported income tax expense of $70 million in 2017, less than $1 million in 2016 and $146 million in 2015. 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. This amount is subject to change as we refine our earnings and profits calculations and as additional guidance is published. The Company will continue to refine its estimates throughout the measurement period provided for in SEC Staff Accounting Bulletin 118, or until its accounting is complete. 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. 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, we completed our detailed analysis of our ability to recognize and utilize foreign tax credits within the carryforward period. As a result, we amended our 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 us in the U.S. Income tax expense also decreased in 2016 as a result of the mix of earnings in our various tax jurisdictions. The tax expense recorded in 2015 includes a net tax benefit of $15 million primarily relating to prior year U.S. research and development tax credits, changes to uncertain tax positions, and prior year income tax adjustments.

The item labeled "Transition Tax" above will result in cash tax payments of less then $1 million to U.S. state and local jurisdictions. Foreign tax credits will offset the U.S. federal portion of the transition tax.

The components of our net deferred tax assets were as follows:

	Year Ended December 31,	
	2017	2016
	(Millions)	
Deferred tax assets —		
Tax loss carryforwards:		
State	$ 19	$ 13
Foreign	114	92
Tax credits	118	83
Postretirement benefits other than pensions	37	55
Pensions	24	48
Bad debts	3	3
Sales allowances	4	7
Payroll accruals	18	39
Other accruals	64	50
Valuation allowance	(163)	(145)
Total deferred tax assets	238	245
Deferred tax liabilities —		
Tax over book depreciation	45	53
Total deferred tax liabilities	45	53
Net deferred tax assets	$ 193	$ 192

State tax loss carryforwards have been presented net of uncertain tax positions that, if realized, would reduce tax loss carryforwards in 2017 and 2016 by $2 million and $3 million , respectively. Additionally, foreign tax loss carryforwards, have been presented net of uncertain tax positions that, if realized, would reduce tax loss carryforwards in both 2017 and 2016 by $7 million .

Following is a reconciliation of deferred taxes to the deferred taxes shown in the balance sheet:

	Year Ended December 31,	
	2017	2016
	(Millions)	
Balance Sheet:		
Non-current portion — deferred tax asset	$ 204	$ 199
Non-current portion — deferred tax liability	(11)	(7)
Net deferred tax assets	$ 193	$ 192

As a result of the valuation allowances recorded for $163 million and $145 million at December 31, 2017 and 2016 , respectively, we have potential tax assets that were not recognized on our 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 that are available to reduce future tax liabilities.

Our state net operating losses ("NOLs") expire in various tax years through 2038. Our non-U.S. NOLs expire in various tax years through 2037, or have unlimited carryforward potential.

We do not provide for U.S. income taxes on unremitted earnings of foreign subsidiaries, except for the earnings of two of our China operations, as our present intention is to reinvest the unremitted earnings in our foreign operations. Unremitted earnings of foreign subsidiaries were approximately $920 million at December 31, 2017 . We 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 $80 million .

U.S. GAAP provides that 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 our uncertain tax positions is as follows:

	2017	2016	2015
		(Millions)	
Uncertain tax positions —			
Balance January 1	$ 111	$ 123	$ 114
Gross increases in tax positions in current period	6	6	7
Gross increases in tax positions in prior period	2	2	14
Gross decreases in tax positions in prior period	(2)	(5)	(4)
Gross decreases — settlements	—	—	(1)
Gross decreases — statute of limitations expired	(5)	(15)	(7)
Balance December 31	$ 112	$ 111	$ 123

Included in the balance of uncertain tax positions were $108 million in 2017 , $108 million in 2016 , $110 million in 2015 , of tax benefits, that if recognized, would affect the effective tax rate. We recognize accrued interest and penalties related to unrecognized tax benefits as income tax expense. Penalties of less than $1 million were accrued in 2017 , 2016 and 2015 . Additionally, we accrued interest expense related to uncertain tax positions of less than $1 million in 2017 , interest expense of less than $1 million in 2016 , and interest income of less than $1 million in 2015 . Our liability for penalties was $1 million at December 31, 2017 , $1 million at December 31, 2016 and $2 million at December 31, 2015 , respectively, and our liability for interest was $4 million at December 31, 2017 , 2016 and 2015 .

Our uncertain tax position at December 31, 2017 and 2016 included exposures relating to the disallowance of deductions, global transfer pricing and various other issues. We believe it is reasonably possible that a decrease of up to $8 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.

We are subject to taxation in the U.S. and various state and foreign jurisdictions. As of December 31, 2017 , our tax years open to examination in primary jurisdictions are as follows:

	Open To Tax Year
United States	2006
China	2007
Spain	2004
Canada	2014
Brazil	2012
Mexico	2012
Belgium	2015
Germany	2013
United Kingdom	2015

8. Common Stock

We have authorized 135 million shares ($0.01 par value) of common stock, of which 66,033,509 shares and 65,891,930 shares were issued at December 31, 2017 and 2016 , respectively. We held 14,592,888 and 11,655,938 shares of treasury stock at December 31, 2017 and 2016 , respectively.

Equity Plans — In December 1996, we adopted the 1996 Stock Ownership Plan, which permitted the granting of a variety of awards, including common stock, restricted stock, performance units, stock equivalent units, stock appreciation rights (“SARs”) and stock options to our directors, officers, employees and consultants. The 1996 plan, which terminated as to new awards on December 31, 2001, was renamed the “Stock Ownership Plan.” In December 1999, we adopted the Supplemental Stock Ownership Plan, which permitted the granting of a variety of similar awards to our directors, officers, employees and consultants. We were authorized to deliver up to about 1.1 million treasury shares of common stock under the Supplemental Stock Ownership Plan, which also terminated as to new awards on December 31, 2001. In March 2002, we adopted the 2002 Long-Term Incentive Plan which permitted the granting of a variety of similar awards to our officers, directors, employees and consultants. Up to 4 million shares of our common stock were authorized for delivery under the 2002 Long-Term Incentive Plan. In March 2006, we adopted the 2006 Long-Term Incentive Plan which replaced the 2002 Long-Term Incentive Plan and permits the granting of a variety of similar awards to directors, officers, employees and consultants. On May 13, 2009, our stockholders approved an amendment to the Tenneco Inc. 2006 Long-Term Incentive Plan to increase the shares of common stock available thereunder by 2.3 million . Each share underlying an award generally counts as one share against the total plan availability under the 2009 amendment, each share underlying a full value award (e.g. restricted stock), however, counts as 1.25 shares against the total plan availability. On May 15, 2013 our stockholders approved another amendment to the Tenneco Inc. 2006 Long-Term Incentive Plan to increase the shares of common stock available thereunder by 3.5 million . As part of this amendment, each share underlying a full value award subsequently issued counts as 1.49 shares against total plan availability. As of December 31, 2017 , up to 2,374,879 shares of our common stock remain authorized for delivery under the 2006 Long-Term Incentive Plan. Our nonqualified stock options have seven to 20 year terms and vest equally over a three -year service period from the date of the grant.

We have granted restricted common stock and stock options to our directors and certain key employees and restricted stock units, payable in cash, to certain key employees. These awards generally require, among other things, that the award holder remain in service to our company during the restriction period, which is currently three years , with a portion of the award vesting equally each year. We have also granted stock equivalent units and long-term performance units to certain key employees that are payable in cash. At December 31, 2017 , the long-term performance units outstanding included a three -year grant for 2015-2017 payable in the first quarter of 2018, 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. Payment is based on the attainment of specified performance goals. Grant value is based on stock price, cumulative EBITDA and free cash flow metrics. In addition, we have granted SARs to certain key employees in our Asian and Indian operations that are payable in cash after a three -year service period. The grant value is indexed to the stock price.

Accounting Methods — We have recorded compensation expense (net of taxes) of less than $1 million , $1 million , and $2 million in the years ended December 31, 2017 , 2016 and 2015 , respectively, related to nonqualified stock options as part of our selling, general and administrative expense. This resulted in a less than $0.01 decrease in basic and diluted earnings per share in 2017 , a $0.01 decrease in basic and diluted earnings per share in 2016 , and a $0.03 decrease in basic and diluted earnings per share in 2015 .

For employees eligible to retire at the grant date, we immediately expense stock options and restricted stock. If employees become eligible to retire during the vesting period, we amortize the expense for stock options and restricted stock over a period starting at the grant date to the date the employee becomes retiree eligible.

As of December 31, 2017 , there was no unrecognized compensation cost related to our stock options awards.

Compensation expense for restricted stock, restricted stock units, long-term performance units and SARs (net of taxes) was $15 million , $18 million , and $12 million for each of the years ended 2017 , 2016 and 2015 , respectively, and was recorded in selling, general, and administrative expense on the consolidated statements of income.

Cash received from stock option exercises was $8 million in 2017 , $16 million in 2016 , and $4 million in 2015 . Stock option exercises generated an excess tax benefit of $2 million in 2017 , $1 million in 2016 and $6 million in 2015 .

Stock Options — The following table reflects the status and activity for all options to purchase common stock for the period indicated:

	Year Ended December 31, 2017			
	Shares Under Option	Weighted Avg. Exercise Prices	Weighted Avg. Remaining Life in Years	Aggregate Intrinsic Value
				(Millions)
Outstanding Stock Options:				
Outstanding, January 1, 2017	606,525	$ 38.54	2.6	$ 12
Canceled	(2,214)	56.23		
Forfeited	(1,107)	56.23		
Exercised	(164,863)	33.70		5
Outstanding, March 31, 2017	438,341	$ 40.22	2.6	$ 11
Forfeited	(278)	66.54		
Exercised	(3,242)	45.42		—
Outstanding, June 30, 2017	434,821	$ 40.16	2.4	$ 8
Forfeited	(41,369)	19.53		
Exercised	(50,125)	34.79		1
Outstanding, September 30, 2017	343,327	$ 43.44	2.4	$ 4
Forfeited	(628)	62.54		
Exercised	(24,683)	40.86		—
Outstanding, December 31, 2017	318,016	$ 43.60	2.3	$ 5

As of December 31, 2017, all outstanding options are exercisable.

There were no stock options granted in 2017, 2016 or 2015. The total intrinsic value of options exercised during the years ended December 31, 2017 , 2016 , and 2015 was $6 million , $11 million and $10 million , respectively. The total fair value of shares vested was $2 million in 2017 , $4 million in 2016 and $6 million in 2015 .

Restricted Stock — The following table reflects the status for all nonvested restricted shares for the period indicated:

	Year Ended December 31, 2017	
	Shares	Weighted Avg. Grant Date Fair Value
Nonvested Restricted Shares		
Nonvested balance at January 1, 2017	591,416	$ 44.63
Granted	182,543	68.04
Vested	(261,003)	50.95
Forfeited	(65,354)	53.12
Nonvested balance at March 31, 2017	447,602	$ 49.25
Granted	23,295	57.22
Vested	(15,336)	46.77
Forfeited	(6,271)	48.10
Nonvested balance at June 30, 2017	449,290	$ 49.79
Granted	2,001	55.80
Vested	(4,581)	55.52
Forfeited	(10,234)	44.82
Nonvested balance at September 30, 2017	436,476	$ 49.87
Vested	(19,228)	47.45
Forfeited	(6,997)	51.79
Nonvested balance at December 31, 2017	410,251	$ 49.95

The fair value of restricted stock grants is equal to the average market price of our stock at the date of grant. As of December 31, 2017 , approximately $8 million of total unrecognized compensation costs related to restricted stock awards is expected to be recognized over a weighted-average period of approximately 1.7 years. For our restricted share grants that have not yet vested, we estimate forfeitures by taking the average of the past actual forfeiture rate for restricted shares.

The weighted average grant-date fair value of restricted stock granted during the years 2017 , 2016 and 2015 was $66.77 , $36.36 , and $52.85 , respectively. The total fair value of restricted shares vested was $14 million in 2017 , $9 million in 2016 and $7 million in 2015 .

Share Repurchase Program — In January 2015, our Board of Directors approved a share repurchase program, authorizing our company to repurchase up to $350 million of our outstanding common stock over a three-year period. In October 2015, our Board of Directors expanded this share repurchase program, authorizing the repurchase of an additional $200 million of the Company’s outstanding common stock. We purchased 4,228,633 shares in 2015 through open market purchases, which were funded through cash from operations, at a total cost of $213 million , at an average price of $50.32 per share. These repurchased shares are held as part of our treasury stock which increased to 7,473,325 at December 31, 2015 from 3,244,692 at December 31, 2014. 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 which increased to 11,655,938 at December 31, 2016 from 7,473,325 at December 31, 2015 .

In February 2017, our Board of Directors authorized the repurchase of up to $400 million of the Company's outstanding common stock over the next three years. This included $112 million then remaining amount authorized under earlier repurchase programs. The company anticipates acquiring the shares through open market or privately negotiated transactions, which will be funded through cash from operations. The repurchase program does not obligate the Company to repurchase shares within any specific time or situations, and opportunities in higher priority areas could affect the cadence of this program. We purchased 2,936,950 shares in 2017 through open market purchases, which were funded through cash from operations, at a total cost of $169 million , at an average price of $57.57 per share. These repurchased shares are held as part of our treasury stock which increased to 14,592,888 at December 31, 2017 from 11,655,938 at December 31, 2016 .

Dividends — 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 initial dividend was payable on March 23, 2017 to stockholders of record as of March 7, 2017. In 2017, we paid a dividend of $0.25 per share each quarter, for an annual dividend of $1.00 per share, or $53 million . The Company did not pay any dividends in fiscal years 2016 or 2015. While we currently expect to pay comparable quarterly cash dividends in the 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.

Long-Term Performance Units, Restricted Stock Units and SARs — Long-term performance units, restricted stock units, and SARs are paid in cash and recognized as a liability based upon their fair value. As of December 31, 2017 , $15 million of total unrecognized compensation costs is expected to be recognized over a weighted-average period of approximately 1.8 years.

9. Preferred Stock

We had 50 million shares of preferred stock ($0.01 par value) authorized at December 31, 2017 and 2016 , respectively. No shares of preferred stock were outstanding at those dates.

10. Pension Plans, Postretirement and Other Employee Benefits

Pension benefits are based on years of service and, for most salaried employees, on average compensation. Our funding policy is to contribute to the plans amounts necessary to satisfy the funding requirement of applicable federal or foreign laws and regulations. Of our $734 million benefit obligation at December 31, 2017 , approximately $666 million required funding under applicable federal and foreign laws. The balance of our benefit obligation, $68 million , did not require funding under applicable federal or foreign laws and regulations. At December 31, 2017 , we had approximately $640 million in assets to fund that obligation. Pension plan assets were invested in the following classes of securities:

	Percentage of Fair Market Value			
	December 31, 2017		December 31, 2016	
	US	Foreign	US	Foreign
Equity Securities	70%	50%	70%	61%
Debt Securities	29%	42%	30%	34%
Real Estate	—	2%	—	2%
Other	1%	6%	—%	3%

Our investment policy for our domestic plan is to invest more heavily in equity securities than debt securities. Targeted pension plan allocations are 70 percent in equity securities and 30 percent in debt securities, with acceptable tolerance levels of plus or minus five percent within each category for our domestic plan. Our foreign 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 debt securities at higher funded ratios.

The assets of some of our 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 of the trusts. The investments for all our pension plans are recorded at estimated fair value, in compliance with the accounting guidance on fair value measurement.

The following table presents our plan assets using the fair value hierarchy as of December 31, 2017 and 2016 , respectively. The fair value hierarchy has three levels based on the methods used to determine the fair value. Level 1 assets refer to those asset values based on quoted market prices in active markets for identical assets at the measurement date. Level 2 assets refer to assets with values determined using significant other observable inputs, and Level 3 assets include values determined with non-observable inputs.

	Fair Value Level as of December 31, 2017					
	US		Foreign			
Asset Category	Level 1	Assets Measurement at NAV	Level 1	Level 2	Level 3	Assets Measurement at NAV
	(Millions)					
Equity securities:						
U.S. large cap	$ 21	$ 85	$ 3	$ 31	$ —	$ 31
U.S. mid cap	—	—	—	2	—	—
U.S. small cap	—	15	—	—	—	—
Non-U.S. large cap	—	15	10	48	—	56
Non-U.S. mid cap	—	—	—	12	—	9
Non-U.S. small cap	—	—	—	3	—	—
Emerging markets	—	5	3	5	—	1
Debt securities:						
U.S. treasuries/government bonds	—	—	1	—	—	—
U.S. corporate bonds	—	3	—	1	—	—
U.S. other fixed income	—	56	—	—	—	—
Non-U.S. treasuries/government bonds	—	—	1	112	—	32
Non-U.S. corporate bonds	—	—	4	15	—	13
Non-U.S. municipal obligations	—	—	—	—	—	1
Non-U.S. other fixed income	—	—	2	—	—	—
Real Estate:						
Non-U.S. real estate	—	—	1	6	—	—
Other:						
Insurance contracts	—	—	—	16	9	—
Cash held in bank accounts	2	—	9	1	—	—
Total	$ 23	$ 179	$ 34	$ 252	$ 9	$ 143

	Fair Value Level as of December 31, 2016					
	US		Foreign			
Asset Category	Level 1	Asset Measurement at NAV	Level 1	Level 2	Level 3	Asset Measurement at NAV
	(Millions)					
Equity securities:						
U.S. large cap	$ 22	$ 77	$ 2	$ 30	$ —	$ 26
U.S. mid cap	—	—	1	2	—	—
U.S. small cap	—	15	—	—	—	—
Non-U.S. large cap	—	—	7	67	—	46
Non-U.S. mid cap	—	15	—	15	—	8
Non-U.S. small cap	—	—	—	10	—	1
Emerging markets	—	5	2	3	—	1
Debt securities:						
U.S. treasuries/government bonds	—	—	1	—	—	—
U.S. corporate bonds	—	2	—	1	—	—
U.S. other fixed income	—	54	—	—	—	—
Non-U.S. treasuries/government bonds	—	—	1	38	—	29
Non-U.S. corporate bonds	—	—	4	23	—	12
Non-U.S. municipal obligations	—	—	—	—	—	1
Non-U.S. other fixed income	—	—	1	—	—	—
Real Estate:						
Non-U.S. real estate	—	—	1	5	—	—
Other:						
Insurance contracts	—	—	—	13	9	—
Cash held in bank accounts	2	—	7	2	—	—
Total	$ 24	$ 168	$ 27	$ 209	$ 9	$ 124

Level 1 assets were valued using market prices based on daily net asset value (NAV) or prices available daily through a public stock exchange. 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, 2017		December 31, 2016	
	Level 3 Assets		Level 3 Assets	
	US	Foreign	US	Foreign
	(Millions)		(Millions)	
Balance at December 31 of the previous year	$ —	$ 9	$ —	$ 8
Actual return on plan assets:				
Relating to assets still held at the reporting date	—	—	—	1
Ending Balance at December 31	$ —	$ 9	$ —	$ 9

The following table contains information about significant concentrations of risk, including all individual assets that make up more than 5 percent of the total assets and any direct investments in Tenneco stock:

Asset Category	Fair Value Level	Value	Percentage of Total Assets
		(Millions)	
2017:			
Tenneco Stock	1	$ 21	3.3%
2016:			
Tenneco Stock	1	$ 22	4.0%

Our 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 our domestic and foreign plans.

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

A summary of the change in benefit obligation, the change in plan assets, the development of net amount recognized, and the amounts recognized in the balance sheets for the pension plans and postretirement benefit plan follows:

	Pension				Postretirement	
	2017		2016		2017	2016
	US	Foreign	US	Foreign	US	US
	(Millions)					
Change in benefit obligation:						
Benefit obligation at December 31 of the previous year	$ 272	$ 438	$ 416	$ 425	$ 143	$ 141
Currency rate conversion	—	42	—	(38)	—	—
Settlement	(7)	(3)	(1)	—	—	—
Service cost	1	9	1	8	—	—
Interest cost	10	13	15	14	6	6
Administrative expenses/taxes paid	—	(2)	—	(1)	—	—
Plan amendments	—	—	—	(1)	—	—
Actuarial (gain)/loss	10	(9)	(7)	50	12	5
Benefits paid	(23)	(18)	(152)	(20)	(10)	(9)
Participants' contributions	—	1	—	1	—	—
Benefit obligation at December 31	$ 263	$ 471	$ 272	$ 438	$ 151	$ 143
Change in plan assets:						
Fair value at December 31 of the previous year	$ 192	$ 369	$ 304	$ 355	$ —	$ —
Currency rate conversion	—	35	—	(33)	—	—
Settlement	(7)	(3)	(1)	—	—	—
Actual return on plan assets	22	42	21	50	—	—
Administrative expenses/taxes paid	—	(2)	—	(1)	—	—
Employer contributions	18	14	20	17	10	9
Participants' contributions	—	1	—	1	—	—
Benefits paid	(23)	(18)	(152)	(20)	(10)	(9)
Fair value at December 31	$ 202	$ 438	$ 192	$ 369	$ —	$ —
Development of net amount recognized:						
Unfunded status at December 31	$ (61)	$ (33)	$ (80)	$ (69)	$ (151)	$ (143)
Unrecognized cost:						
Actuarial loss	135	122	146	145	56	48
Prior service cost/(credit)	—	3	—	4	(3)	(4)
Net amount recognized at December 31	$ 74	$ 92	$ 66	$ 80	$ (98)	$ (99)
Amounts recognized in the balance sheets as of December 31						
Noncurrent assets	$ —	$ 28	$ —	$ 9	$ —	$ —
Current liabilities	(2)	(3)	(20)	(2)	(9)	(10)
Noncurrent liabilities	(59)	(58)	(60)	(76)	(142)	(133)
Net amount recognized	$ (61)	$ (33)	$ (80)	$ (69)	$ (151)	$ (143)

Assets of one plan may not be utilized to pay benefits of other plans. Additionally, the prepaid (accrued) pension cost has been recorded based upon certain actuarial estimates as described below. Those estimates are subject to revision in future periods given new facts or circumstances.

Net periodic pension costs for the years 2017 , 2016 and 2015 , consist of the following components:

	2017		2016		2015	
	US	Foreign	US	Foreign	US	Foreign
	(Millions)					
Service cost — benefits earned during the year	$ 1	$ 9	$ 1	$ 8	$ 1	$ 9
Interest cost	10	13	15	14	17	15
Expected return on plan assets	(14)	(25)	(23)	(20)	(23)	(21)
Settlement loss	8	1	72	—	4	—
Net amortization:						
Actuarial loss	5	9	8	7	8	8
Prior service cost	—	1	—	1	—	1
Net pension costs	$ 10	$ 8	$ 73	$ 10	$ 7	$ 12

Amounts recognized in accumulated other comprehensive loss for pension benefits consist of the following components:

	2017		2016	
	US	Foreign	US	Foreign
	(Millions)			
Net actuarial loss	$ 135	$ 122	$ 146	$ 145
Prior service cost	—	3	—	4
	$ 135	$ 125	$ 146	$ 149

Amounts recognized for pension and postretirement benefits in other comprehensive income for the year ended December 31, 2017 and 2016 include the following components:

	Year Ended December 31,					
	2017			2016		
	Before-Tax Amount	Tax Benefit	Net-of-Tax Amount	Before-Tax Amount	Tax Benefit	Net-of-Tax Amount
	(Millions)					
Defined benefit pension and postretirement plans:						
Change in total actuarial gain (loss)	$ 12	$ (4)	$ 8	$ 51	$ (21)	$ 30
Amortization of prior service cost included in net periodic pension and postretirement cost	—	—	—	(1)	—	(1)
Amortization of actuarial gain (loss) included in net periodic pension and postretirement cost	26	(7)	19	20	(8)	12
Other comprehensive income — pension benefits	$ 38	$ (11)	$ 27	$ 70	$ (29)	$ 41

In 2018 , we expect to recognize the following amounts, which are currently reflected in accumulated other comprehensive loss, as components of net periodic benefit cost:

	2018	
	US	Foreign
	(Millions)	
Net actuarial loss	$ 5	$ 7
Prior service cost	—	1
	$ 5	$ 8

The projected benefit obligation, accumulated benefit obligation and fair value of plan assets for all pension plans with accumulated benefit obligations in excess of plan assets at December 31, 2017 and 2016 were as follows:

	December 31, 2017		December 31, 2016	
	US	Foreign	US	Foreign
	(Millions)			
Projected benefit obligation	$ 263	$ 117	$ 272	$ 266
Accumulated benefit obligation	263	112	272	261
Fair value of plan assets	202	56	192	188

The following estimated benefit payments are payable from the pension plans to participants:

Year	US	Foreign
	(Millions)	
2018	$ 14	$ 20
2019	15	21
2020	16	23
2021	14	22
2022	16	23
2023-2027	76	128

The following assumptions were used in the accounting for the pension plans for the years of 2017 , 2016 , and 2015 :

	2017		2016	
	US	Foreign	US	Foreign
Weighted-average assumptions used to determine benefit obligations				
Discount rate	3.8%	2.6%	4.2%	2.8%
Rate of compensation increase	N/A	2.5%	N/A	2.5%

	2017		2016		2015	
	US	Foreign	US	Foreign	US	Foreign
Weighted-average assumptions used to determine net periodic benefit cost						
Discount rate	4.2%	2.8%	4.3%	3.5%	4.1%	3.2%
Expected long-term return on plan assets	7.8%	5.2%	7.6%	5.7%	7.8%	5.9%
Rate of compensation increase	N/A	2.5%	N/A	2.7%	N/A	3.0%

We made contributions of $32 million to our pension plans during 2017 . Based on current actuarial estimates, we believe we will be required to make contributions of $15 million to those plans during 2018 . Pension contributions beyond 2018 will be required, but those amounts will vary based upon many factors, including the performance of our pension fund investments during 2018 and future discount rate changes.

In February 2016, the Company launched a voluntary program to buy out active employees and retirees who have 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 .

We have life insurance plans which provided benefit to a majority of our U.S. employees. We also have postretirement plans for our U.S. employees hired before January 1, 2001. The plans cover salaried employees retiring on or after attaining age 55 who have at least 10 years of service with us. For hourly employees, the postretirement benefit plans generally cover employees who retire according to one of our hourly employee retirement plans. All of these benefits may be subject to deductibles, co-payment provisions and other limitations, and we have reserved the right to change these benefits. For those employees hired after January 1, 2001, we do not provide any postretirement benefits. Our postretirement healthcare and life insurance plans are not funded. The measurement date used to determine postretirement benefit obligations is December 31.

Net periodic postretirement benefit cost for the years 2017 , 2016 , and 2015 , consists of the following components:

	2017	2016	2015
		(Millions)	
Service cost — benefits earned during the year	$ —	$ —	$ —
Interest on accumulated postretirement benefit obligation	6	6	6
Net amortization:			
Actuarial loss	—	5	6
Prior service credit	(1)	(1)	(4)
Prior period correction	4	—	—
Net periodic postretirement benefit cost	$ 9	$ 10	$ 8

In 2018 , we expect to recognize the following amounts, which are currently reflected in accumulated other comprehensive loss, as components of net periodic benefit cost:

	2018
	(Millions)
Net actuarial loss	$ 6
Prior service credit	(1)
	$ 5

The following estimated postretirement benefit payments are payable from the plan to participants:

Year	Postretirement Benefits
	(Millions)
2018	$ 9
2019	9
2020	9
2021	9
2022	9
2023-2027	45

We do not expect to receive any future subsidies under the Medicare Prescription Drug, Improvement, and Modernization Act.

The weighted-average assumed health care cost trend rate used in determining the 2017 accumulated postretirement benefit obligation was 6.8 percent , declining to 4.5 percent by 2027. For 2016 , the health care cost trend rate was 7.0 percent declining to 4.5 percent by 2026 and for 2015 , the health care cost trend rate was 7.0 percent declining to 4.5 percent by 2026.

The following assumptions were used in the accounting for postretirement cost for the years of 2017 , 2016 and 2015 :

	2017	2016
Weighted-average assumptions used to determine benefit obligations		
Discount rate	3.8%	4.2%
Rate of compensation increase	N/A	N/A

	2017	2016	2015
Weighted-average assumptions used to determine net periodic benefit cost			
Discount rate	4.2%	4.3%	4.1%
Rate of compensation increase	N/A	N/A	N/A

A one-percentage-point increase in the 2017 assumed health care cost trend rates would increase total service and interest cost by $1 million and would increase the postretirement benefit obligation by $17 million . A one-percentage-point decrease in the 2017 assumed health care cost trend rates would decrease the total service and interest cost by $1 million and decrease the postretirement benefit obligation by $14 million .

Based on current actuarial estimates, we believe we will be required to make postretirement contributions of approximately $9 million during 2018 .

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"). Under the plan, subject to limitations in the Internal Revenue Code, participants may elect to defer up to 75 percent of their salary through contributions to the plan, which are invested in selected mutual funds or used to buy our common stock. We match 100 percent of an employee's contributions up to three percent of the employee's salary and 50 percent of an employee's contributions that are between three percent and five percent of the employee's salary. In connection with freezing the defined benefit pension plans for nearly all U.S. based salaried and non-union hourly employees effective December 31, 2006, and the related replacement of those defined benefit plans with defined contribution plans, we are making additional contributions to the Employee Stock Ownership Plans. We recorded expense for these contributions of approximately $29 million , $28 million and $27 million in 2017 , 2016 and 2015 , respectively. Matching contributions vest immediately. Defined benefit replacement contributions fully vest on the employee's third anniversary of employment.

11. Segment and Geographic Area Information

In connection with the reportable segment changes announced on February 7, 2017, our Clean Air and Ride Performance product lines in India, which have been reported as part of Europe, South America and India segments, will now be reported with their respective product lines in the Asia Pacific segments. Beginning with the first quarter of 2017, we are organized and manage our business along our two major product lines (clean air and ride performance) and three geographic areas (North America; Europe and South America; Asia Pacific), resulting in six operating segments (North America Clean Air, North America Ride Performance, Europe and South America Clean Air, Europe and South America Ride Performance, Asia Pacific Clean Air and Asia Pacific Ride Performance). Within each geographical area, each operating segment manufactures and distributes either clean air or ride performance products primarily for the original equipment and aftermarket industries. Each of the six operating segments constitutes a reportable segment. Costs related to other business activities, primarily corporate headquarter functions, are disclosed separately from the six operating segments as "Other." We evaluate segment performance based primarily on earnings before interest expense, income taxes, and noncontrolling interests. Products are transferred between segments and geographic areas on a basis intended to reflect as nearly as possible the "market value" of the products.

Segment results for 2017 , 2016 and 2015 are as follows:

	Clean Air Division			Ride Performance Division					
	North America	Europe and South America	Asia Pacific	North America	Europe and South America	Asia Pacific	Other	Reclass & Elims	Total
					(Millions)				
At December 31, 2017, and for the Year Ended									
Revenues from external customers	$ 3,101	$ 2,207	$ 1,209	$ 1,224	$ 1,076	$ 457	$ —	$ —	$ 9,274
Intersegment revenues	17	46	2	11	32	57	—	(165)	—
EBIT, Earnings (loss) before interest expense, income taxes, and noncontrolling interests	203	112	133	120	21	58	(230)	—	417
Total assets	1,344	834	843	753	606	399	—	63	4,842
At December 31, 2016, and for the Year Ended									
Revenues from external customers	$ 3,003	$ 1,939	$ 1,127	$ 1,234	$ 909	$ 387	$ —	$ —	$ 8,599
Intersegment revenues	13	92	3	9	27	48	—	(192)	—
EBIT, Earnings (loss) before interest expense, income taxes, and noncontrolling interests	220	98	150	157	16	63	(188)	—	516
Total assets	1,356	697	683	723	488	352	—	47	4,346
At December 31, 2015, and for the Year Ended									
Revenues from external customers	$ 2,823	$ 1,792	$ 1,080	$ 1,313	$ 846	$ 327	$ —	$ —	$ 8,181
Intersegment revenues	16	100	—	10	30	46	—	(202)	—
EBIT, Earnings (loss) before interest expense, income taxes, and noncontrolling interests	244	49	114	155	(11)	44	(87)	—	508
Total assets	1,210	680	628	692	424	304	—	32	3,970

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The following table shows information relating to our external customer revenues for each product or each group of similar products:

	Net Sales Year Ended December 31,		
	2017	2016	2015
	(Millions)		
Clean Air Products & Systems			
Aftermarket	$ 301	$ 305	$ 318
Original Equipment			
OE Value-add	4,029	3,736	3,489
OE Substrate	2,187	2,028	1,888
	6,216	5,764	5,377
	6,517	6,069	5,695
Ride Performance Products & Systems			
Aftermarket	950	937	941
Original Equipment	1,807	1,593	1,545
	2,757	2,530	2,486
Total Revenues	$ 9,274	$ 8,599	$ 8,181

The following customers accounted for 10 percent or more of our net sales in the last three years. The net sales to both customers were across segments.

Customer	2017	2016	2015
General Motors Company	14%	17%	15%
Ford Motor Company	13%	13%	14%

The following table shows information relating to the geographic regions in which we operate:

	Geographic Area							
	United States	China	Germany	Poland	United Kingdom	Other Foreign (a)	Reclass & Elims	Consolidated
	(Millions)							
At December 31, 2017, and for the Year Then Ended								
Revenues from external customers(b)	$ 3,632	$ 1,283	$ 798	$ 488	$ 482	$ 2,591	$ —	$ 9,274
Long-lived assets(c)	620	279	136	216	46	470	—	$ 1,767
Total assets	1,831	988	304	383	205	1,221	(90)	$ 4,842
At December 31, 2016, and for the Year Then Ended								
Revenues from external customers(b)	$ 3,512	$ 1,186	$ 764	$ 385	$ 387	$ 2,365	$ —	$ 8,599
Long-lived assets(c)	541	217	111	165	38	397	—	$ 1,469
Total assets	1,897	795	231	322	130	1,119	(148)	$ 4,346
At December 31, 2015, and for the Year Then Ended								
Revenues from external customers(b)	$ 3,334	$ 1,101	$ 807	$ 250	$ 307	$ 2,382	$ —	$ 8,181
Long-lived assets(c)	496	203	108	144	32	373	—	1,356
Total assets	1,726	699	258	275	101	1,027	(116)	3,970

(a) Revenues from external customers and long-lived assets for individual foreign countries other than China, Germany, Poland, and United Kingdom 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.

12. Commitments and Contingencies

Capital Commitments

We estimate that expenditures aggregating approximately $149 million will be required after December 31, 2017 to complete facilities and projects authorized at such date, and we have made substantial commitments in connection with these facilities and projects.

Lease Commitments

Our facilities and equipment are generally leased under arrangements that are accounted for as operating leases. Total rental expense for the fiscal years ended December 31, 2017 , 2016 and 2015 was $81 million , $74 million and $70 million , respectively. Future minimum operating lease payments at December 31, 2017 are as follows:

	(Millions)
2018	$ 46
2019	36
2020	30
2021	23
2022	18
Beyond 2022	25
Total minimum lease payments	$ 178

Certain equipment is leased under long term agreements. Capital assets for these agreements were less than $1 million at both December 31, 2017 and 2016 . The minimum lease payments under our non-cancelable capital leases with lease terms in excess of one year are less than $1 million in each of the next five years.

Environmental Matters, Legal Proceedings and Product Warranties

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 United States 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 expense or capitalize, as appropriate, expenditures for ongoing compliance with environmental regulations that relate to current operations. We expense costs related to an existing condition caused by past operations that do not contribute to current or future revenue generation. As of December 31, 2017 , we have the obligation to remediate or contribute towards the remediation of certain sites, including one Federal Superfund site. At December 31, 2017 , our aggregated estimated share of environmental remediation costs for all these sites on a discounted basis was approximately $14 million , of which $2 million is recorded in other current liabilities and $12 million is recorded in deferred credits and other liabilities in our consolidated balance sheet. For those locations where the liability was discounted, the weighted average discount rate used was 2.3 percent . The undiscounted value of the estimated remediation costs was $17 million . Our expected payments of environmental remediation costs are estimated to be approximately $2 million in 2018 , $1 million each year beginning 2019 through 2022 and $11 million in aggregate thereafter.

Based on information known to us, 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 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 in excess of our share of remediation costs. Our understanding of the financial strength of other potentially responsible parties 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 potentially responsible party in the Federal Superfund site, or as a liable party at the other locations referenced herein, will be material to our consolidated financial position, results of operations, or liquidity.

Antitrust Investigations and Litigation

On March 25, 2014, representatives of the European Commission 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 March 25, 2014, we also received a related subpoena from the U.S. Department of Justice ("DOJ").

On November 5, 2014, the DOJ granted us conditional leniency pursuant to an agreement we entered into under the Antitrust Division's Corporate Leniency Policy. This agreement provides us with important benefits 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 us, nor seek any criminal fines or penalties, in connection with the matters we reported to the DOJ. Additionally, there are limits on our liability related to any follow-on civil antitrust litigation in the U.S. 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 our satisfying the DOJ and any court presiding over such follow-on civil litigation.

On April 27, 2017, Tenneco received notification from the European Commission (EC) that it has administratively closed its global antitrust inquiry regarding the production, assembly, and supply of complete exhaust systems. No charges against Tenneco 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 our company. We have cooperated and continue to cooperate fully with all of these antitrust investigations, and take other actions to minimize our potential exposure.

Tenneco and certain of its competitors are also currently defendants in civil putative class action litigation 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 we received conditional leniency from the DOJ, our civil liability in U.S. follow on actions 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 exposure for U.S. follow-on actions.

Following the EC's decision to administratively close its antitrust inquiry into exhaust systems in 2017, Tenneco's receipt of conditional leniency from the DOJ in 2014 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 Tenneco and/or certain of its competitors in the U.S., Tenneco 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, Tenneco settled an administrative action brought by Brazil's competition authority for an amount that was not material. Additionally, in February 2018, Tenneco 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 Tenneco in the United States. Based upon those earlier developments, including settlement discussions, Tenneco 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 Tenneco's antitrust matters globally, which primarily involves the resolution of civil suits and related claims. Of the $132 million reserve that was established, $45 million was paid in 2017 to resolve certain antitrust claims and the remaining reserve is recorded in other current liabilities. While Tenneco continues to cooperate with certain competition agencies investigating possible violations of antitrust laws relating to products supplied by Tenneco, 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 Tenneco can make a reasonable estimate of the costs to resolve such outstanding matters. Tenneco'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 the control of Tenneco. As a result, Tenneco'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, 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.

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 nationwide. A small number of claims have been asserted against one of our subsidiaries by railroad workers alleging exposure to asbestos products in railroad cars. The substantial majority of the remaining claims are related to alleged exposure to asbestos in our automotive products although a significant number of those claims appear also to involve occupational exposures sustained in industries other than automotive. We believe, based on scientific and other evidence, it is unlikely that 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. 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 future consolidated financial position, results of operations or liquidity.

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. For example, in July 2017 a complaint was filed against us in federal district court in Chicago, Illinois alleging that we misappropriated a third party's trade secrets in connection with certain of our ride control products.

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" and in this paragraph we do not expect the legal proceedings, claims or investigations currently pending against us will have any material adverse impact on our consolidated financial position, results of operations or liquidity. With respect to the trade secret claim described above, we are in the process of evaluating the claim but, at this stage of the case and given the inherent uncertainly of litigation, we are unable to estimate whether a loss is reasonably possible. While we do not believe that this litigation will have a material adverse effect on our annual consolidated financial position, results of operations or liquidity, we cannot assure you that this will be the case.

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 current and long-term liabilities on the balance sheet.

Below is a table that shows the activity in the warranty accrual accounts:

	Year Ended December 31,		
	2017	2016	2015
		(Millions)	
Beginning Balance	$ 20	$ 23	$ 26
Accruals related to product warranties	16	12	15
Reductions for payments made	(10)	(15)	(18)
Ending Balance	$ 26	$ 20	$ 23

13. Supplemental Guarantor Condensed Consolidating Financial Statements

Basis of Presentation

Substantially all of our existing and future material domestic 100% owned subsidiaries (which are referred to as the Guarantor Subsidiaries) fully and unconditionally guarantee our senior notes due in 2024 and 2026 on a joint and several basis. However, a subsidiary's guarantee may be released in certain customary circumstances such as a sale of the subsidiary or all or substantially all of its assets in accordance with the indenture applicable to the notes. The Guarantor Subsidiaries are combined in the presentation below.

These consolidating financial statements are presented on the equity method. Under this method, our investments are recorded at cost and adjusted for our ownership share of a subsidiary's cumulative results of operations, capital contributions and distributions, and other equity changes. You should read the condensed consolidating financial information of the Guarantor Subsidiaries in connection with our condensed consolidated financial statements and related notes of which this note is an integral part.

Distributions

There are no significant restrictions on the ability of the Guarantor Subsidiaries to make distributions to us.

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

STATEMENT OF COMPREHENSIVE INCOME (LOSS)

	Year Ended December 31, 2017				
	Guarantor Subsidiaries	Nonguarantor Subsidiaries	Tenneco Inc. (Parent Company)	Reclass & Elims	Consolidated
			(Millions)		
Revenues					
Net sales and operating revenues —					
External	$ 3,889	$ 5,385	$ —	$ —	$ 9,274
Affiliated companies	540	640	—	(1,180)	—
	4,429	6,025	—	(1,180)	9,274
Costs and expenses					
Cost of sales (exclusive of depreciation and amortization shown below)	3,776	5,216	—	(1,180)	7,812
Goodwill impairment charge	—	11	—	—	11
Engineering, research, and development	77	81	—	—	158
Selling, general, and administrative	363	285	—	—	648
Depreciation and amortization of other intangibles	88	136	—	—	224
	4,304	5,729	—	(1,180)	8,853
Other income (expense)					
Loss on sale of receivables	(2)	(3)	—	—	(5)
Other income (expense)	2	52	—	(53)	1
	—	49	—	(53)	(4)
Earnings (loss) before interest expense, income taxes, noncontrolling interests and equity in net income from affiliated companies	125	345	—	(53)	417
Interest expense —					
External (net of interest capitalized)	19	5	49	—	73
Affiliated companies (net of interest income)	(15)	6	9	—	—
Earnings (loss) before income taxes, noncontrolling interests and equity in net income from affiliated companies	121	334	(58)	(53)	344
Income tax expense (benefit)	(12)	82			70
Equity in net income (loss) from affiliated companies	149	—	265	(414)	—
Net income (loss)	282	252	207	(467)	274
Less: Net income attributable to noncontrolling interests	—	67	—	—	67
Net income (loss) attributable to Tenneco Inc.	$ 282	$ 185	$ 207	$ (467)	$ 207
Comprehensive income (loss) attributable to Tenneco Inc.	$ 282	$ 185	$ 331	$ (467)	$ 331

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

STATEMENT OF COMPREHENSIVE INCOME (LOSS)

	Year Ended December 31, 2016				
	Guarantor Subsidiaries	Nonguarantor Subsidiaries	Tenneco Inc. (Parent Company)	Reclass & Elims	Consolidated
			(Millions)		
Revenues					
Net sales and operating revenues —					
External	$ 3,865	$ 4,734	$ —	$ —	$ 8,599
Affiliated companies	526	747	—	(1,273)	—
	4,391	5,481	—	(1,273)	8,599
Costs and expenses					
Cost of sales (exclusive of depreciation and amortization shown below)	3,720	4,676	—	(1,273)	7,123
Engineering, research, and development	76	78	—	—	154
Selling, general, and administrative	311	277	1	—	589
Depreciation and amortization of other intangibles	86	126	—	—	212
	4,193	5,157	1	(1,273)	8,078
Other income (expense)					
Loss on sale of receivables	(2)	(3)	—	—	(5)
Other income (expense)	(9)	24	—	(15)	—
	(11)	21	—	(15)	(5)
Earnings (loss) before interest expense, income taxes, noncontrolling interests and equity in net income from affiliated companies	187	345	(1)	(15)	516
Interest expense —					
External (net of interest capitalized)	(2)	4	90	—	92
Affiliated companies (net of interest income)	(12)	7	5	—	—
Earnings (loss) before income taxes, noncontrolling interests and equity in net income from affiliated companies	201	334	(96)	(15)	424
Income tax expense	(97)	97	—	—	—
Equity in net income (loss) from affiliated companies	166	—	452	(618)	—
Net income (loss)	464	237	356	(633)	424
Less: Net income attributable to noncontrolling interests	—	68	—	—	68
Net income (loss) attributable to Tenneco Inc.	$ 464	$ 169	$ 356	$ (633)	$ 356
Comprehensive income (loss) attributable to Tenneco Inc.	$ 464	$ 169	$ 356	$ (633)	$ 356

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

STATEMENT OF COMPREHENSIVE INCOME (LOSS)

	Year Ended December 31, 2015				
	Guarantor Subsidiaries	Nonguarantor Subsidiaries	Tenneco Inc. (Parent Company)	Reclass & Elims	Consolidated
			(Millions)		
Revenues					
Net sales and operating revenues —					
External	$ 3,683	$ 4,498	$ —	$ —	$ 8,181
Affiliated companies	411	558	—	(969)	—
	4,094	5,056	—	(969)	8,181
Costs and expenses					
Cost of sales (exclusive of depreciation and amortization shown below)	3,414	4,383	—	(969)	6,828
Engineering, research, and development	70	76	—	—	146
Selling, general, and administrative	193	295	3	—	491
Depreciation and amortization of other intangibles	87	116	—	—	203
	3,764	4,870	3	(969)	7,668
Other income (expense)					
Loss on sale of receivables	(1)	(3)	—	—	(4)
Other income (expense)	41	6	—	(48)	(1)
	40	3	—	(48)	(5)
Earnings (loss) before interest expense, income taxes, noncontrolling interests and equity in net income from affiliated companies	370	189	(3)	(48)	508
Interest expense —					
External (net of interest capitalized)	(2)	3	66	—	67
Affiliated companies (net of interest income)	54	(56)	2	—	—
Earnings (loss) before income taxes, noncontrolling interests and equity in net income from affiliated companies	318	242	(71)	(48)	441
Income tax expense	43	103	—	—	146
Equity in net income (loss) from affiliated companies	78	—	312	(390)	—
Net income (loss)	353	139	241	(438)	295
Less: Net income attributable to noncontrolling interests	—	54	—	—	54
Net income (loss) attributable to Tenneco Inc.	$ 353	$ 85	$ 241	$ (438)	$ 241
Comprehensive income (loss) attributable to Tenneco Inc.	$ 353	$ 85	$ 121	$ (438)	$ 121

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

BALANCE SHEET

	December 31, 2017				
	Guarantor Subsidiaries	Nonguarantor Subsidiaries	Tenneco Inc. (Parent Company)	Reclass & Elims	Consolidated
			(Millions)		
ASSETS					
Current assets:					
Cash and cash equivalents	$ 7	$ 308	$ —	$ —	$ 315
Restricted cash	—	3	—	—	3
Receivables, net	402	1,567	—	(648)	1,321
Inventories	383	486	—	—	869
Prepayments and other	99	192	—	—	291
Total current assets	891	2,556	—	(648)	2,799
Other assets:					
Investment in affiliated companies	1,389	—	1,258	(2,647)	—
Notes and advances receivable from affiliates	791	19,119	3,967	(23,877)	—
Long-term receivables, net	8	1	—	—	9
Goodwill	22	27	—	—	49
Intangibles, net	5	17	—	—	22
Deferred income taxes	161	43	—	—	204
Other	66	78	—	—	144
	2,442	19,285	5,225	(26,524)	428
Plant, property, and equipment, at cost	1,478	2,530	—	—	4,008
Less — Accumulated depreciation and amortization	(934)	(1,459)	—	—	(2,393)
	544	1,071	—	—	1,615
Total assets	$ 3,877	$ 22,912	$ 5,225	$ (27,172)	$ 4,842
LIABILITIES AND SHAREHOLDERS' EQUITY					
Current liabilities:					
Short-term debt (including current maturities of long-term debt)					
Short-term debt — non-affiliated	$ —	$ 83	$ —	$ —	$ 83
Short-term debt — affiliated	408	148	—	(556)	—
Accounts payable	562	1,232	—	(89)	1,705
Accrued taxes	8	37	—	—	45
Other	203	221	12	(3)	433
Total current liabilities	1,181	1,721	12	(648)	2,266
Long-term debt — non-affiliated	632	12	714	—	1,358
Long-term debt — affiliated	1,093	18,981	3,803	(23,877)	—
Deferred income taxes	—	11	—	—	11
Pension, postretirement benefits and other liabilities	296	127	—	—	423
Commitments and contingencies					
Total liabilities	3,202	20,852	4,529	(24,525)	4,058
Redeemable noncontrolling interests	—	42	—	—	42
Tenneco Inc. Shareholders' equity	675	1,972	696	(2,647)	696
Noncontrolling interests	—	46	—	—	46
Total equity	675	2,018	696	(2,647)	742
Total liabilities, redeemable noncontrolling interests and equity	$ 3,877	$ 22,912	$ 5,225	$ (27,172)	$ 4,842

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

BALANCE SHEET

	December 31, 2016				
	Guarantor Subsidiaries	Nonguarantor Subsidiaries	Tenneco Inc. (Parent Company)	Reclass & Elims	Consolidated
			(Millions)		
ASSETS					
Current assets:					
Cash and cash equivalents	$ 9	$ 338	$ —	$ —	$ 347
Restricted cash	—	2	—	—	2
Receivables, net	386	1,412	—	(504)	1,294
Inventories	361	369	—	—	730
Prepayments and other	62	167	—	—	229
Total current assets	818	2,288	—	(504)	2,602
Other assets:					
Investment in affiliated companies	1,211	—	1,207	(2,418)	—
Notes and advances receivable from affiliates	939	16,529	4,781	(22,249)	—
Long-term receivables, net	9	—	—	—	9
Goodwill	22	35	—	—	57
Intangibles, net	7	12	—	—	19
Deferred income taxes	47	23	129	—	199
Other	46	49	8	—	103
	2,281	16,648	6,125	(24,667)	387
Plant, property, and equipment, at cost	1,371	2,177	—	—	3,548
Less — Accumulated depreciation and amortization	(895)	(1,296)	—	—	(2,191)
	476	881	—	—	1,357
Total assets	$ 3,575	$ 19,817	$ 6,125	$ (25,171)	$ 4,346
LIABILITIES AND SHAREHOLDERS' EQUITY					
Current liabilities:					
Short-term debt (including current maturities of long-term debt)					
Short-term debt — non-affiliated	$ —	$ 75	$ 15	$ —	$ 90
Short-term debt — affiliated	167	187	—	(354)	—
Accounts payable	562	1,027	—	(88)	1,501
Accrued taxes	4	35	—	—	39
Other	147	243	15	(62)	343
Total current liabilities	880	1,567	30	(504)	1,973
Long-term debt — non-affiliated	—	12	1,282	—	1,294
Long-term debt — affiliated	1,543	16,466	4,240	(22,249)	—
Deferred income taxes	—	7	—	—	7
Postretirement benefits and other liabilities	297	115	—	—	412
Commitments and contingencies					
Total liabilities	2,720	18,167	5,552	(22,753)	3,686
Redeemable noncontrolling interests	—	40	—	—	40
Tenneco Inc. Shareholders' equity	855	1,563	573	(2,418)	573
Noncontrolling interests	—	47	—	—	47
Total equity	855	1,610	573	(2,418)	620
Total liabilities, redeemable noncontrolling interests and equity	$ 3,575	$ 19,817	$ 6,125	$ (25,171)	$ 4,346

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

STATEMENT OF CASH FLOWS

	Year Ended December 31, 2017				
	Guarantor Subsidiaries	Nonguarantor Subsidiaries	Tenneco Inc. (Parent Company)	Reclass & Elims	Consolidated
			(Millions)		
Operating Activities					
Net cash provided (used) by operating activities	$ 284	$ 402	$ (4)	$ (53)	$ 629
Investing Activities					
Proceeds from sale of assets	3	5	—	—	8
Proceeds from sale of equity interest		9			9
Cash payments for plant, property, and equipment	(148)	(246)	—	—	(394)
Cash payments for software related intangible assets	(16)	(9)	—	—	(25)
Change in restricted cash	—	(1)	—	—	(1)
Other	(4)	(6)			(10)
Net cash used by investing activities	(165)	(248)	—	—	(413)
Financing Activities					
Cash dividends			(53)		(53)
Retirement of long-term debt	(10)	(3)	(6)	—	(19)
Issuance of long-term debt	400	1	(264)	—	137
Debt issuance cost on long-term debt	(8)	—	—	—	(8)
Purchase of common stock under the share repurchase program	—	—	(169)	—	(169)
Issuance of common shares	—	—	(1)	—	(1)
Increase in bank overdrafts	—	(7)	—	—	(7)
Net increase in revolver borrowings and short-term debt excluding current maturities of long-term debt	246	5	(318)	—	(67)
Intercompany dividends and net increase (decrease) in intercompany obligations	(749)	(119)	815	53	—
Distribution to noncontrolling interests partners	—	(64)	—	—	(64)
Net cash provided (used) by financing activities	(121)	(187)	4	53	(251)
Effect of foreign exchange rate changes on cash and cash equivalents	—	3	—	—	3
Increase in cash and cash equivalents	(2)	(30)	—	—	(32)
Cash and cash equivalents, January 1	9	338	—	—	347
Cash and cash equivalents, December 31 (Note)	$ 7	$ 308	$ —	$ —	$ 315

Note: Cash and cash equivalents include highly liquid investments with a maturity of three months or less at the date of purchase.

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

STATEMENT OF CASH FLOWS

	Year Ended December 31, 2016				
	Guarantor Subsidiaries	Nonguarantor Subsidiaries	Tenneco Inc. (Parent Company)	Reclass & Elims	Consolidated
			(Millions)		
Operating Activities					
Net cash provided (used) by operating activities	$ 176	$ 300	$ 23	$ (15)	$ 484
Investing Activities					
Proceeds from sale of assets	—	6	—	—	6
Cash payments for plant, property, and equipment	(117)	(208)	—	—	(325)
Cash payments for software related intangible assets	(13)	(7)	—	—	(20)
Change in restricted cash	—	(1)	—	—	(1)
Net cash used by investing activities	(130)	(210)	—	—	(340)
Financing Activities					
Retirement of long-term debt	—	(16)	(515)	—	(531)
Issuance of long-term debt	—	9	500	—	509
Debt issuance cost on long-term debt	—	—	(9)	—	(9)
Purchase of common stock under the share repurchase program	—	—	(225)	—	(225)
Issuance of common shares	—	—	13	—	13
Increase in bank overdrafts	—	10	—	—	10
Net increase in revolver borrowings and short-term debt excluding current maturities of long-term debt and short-term borrowings secured by accounts receivable	—	5	197	—	202
Intercompany dividends and net increase (decrease) in intercompany obligations	(39)	8	16	15	—
Distribution to noncontrolling interests partners	—	(55)	—	—	(55)
Net cash provided (used) by financing activities	(39)	(39)	(23)	15	(86)
Effect of foreign exchange rate changes on cash and cash equivalents	—	2	—	—	2
Increase in cash and cash equivalents	7	53	—	—	60
Cash and cash equivalents, January 1	2	285	—	—	287
Cash and cash equivalents, December 31 (Note)	$ 9	$ 338	$ —	$ —	$ 347

Note: Cash and cash equivalents include highly liquid investments with a maturity of three months or less at the date of purchase.

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

STATEMENT OF CASH FLOWS

	Year Ended December 31, 2015				
	Guarantor Subsidiaries	Nonguarantor Subsidiaries	Tenneco Inc. (Parent Company)	Reclass & Elims	Consolidated
			(Millions)		
Operating Activities					
Net cash provided (used) by operating activities	$ 204	$ 311	$ 60	$ (47)	$ 528
Investing Activities					
Proceeds from sale of assets	—	4	—	—	4
Cash payments for plant, property, and equipment	(114)	(172)	—	—	(286)
Cash payments for software related intangible assets	(16)	(7)	—	—	(23)
Change in restricted cash	—	2	—	—	2
Net cash used by investing activities	(130)	(173)	—	—	(303)
Financing Activities					
Retirement of long-term debt	—	(22)	(15)	—	(37)
Issuance of long-term debt	—	1	—	—	1
Debt issuance cost on long-term debt	—	—	(1)	—	(1)
Tax impact from stock-based compensation	—	—	—	—	—
Purchase of common stock under the share repurchase program	—	—	(213)	—	(213)
Issuance of common shares	—	—	1	—	1
Decrease in bank overdrafts	—	(22)	—	—	(22)
Net increase in revolver borrowings and short-term debt excluding current maturities of long-term debt and short-term borrowings secured by accounts receivable	—	20	82	—	102
Net increase (decrease) in short-term borrowings secured by accounts receivable	—	—	30	—	30
Intercompany dividends and net increase (decrease) in intercompany obligations	(82)	(21)	56	47	—
Distribution to noncontrolling interests partners	—	(44)	—	—	(44)
Net cash provided (used) by financing activities	(82)	(88)	(60)	47	(183)
Effect of foreign exchange rate changes on cash and cash equivalents	—	(37)	—	—	(37)
Increase (decrease) in cash and cash equivalents	(8)	13	—	—	5
Cash and cash equivalents, January 1	10	272	—	—	282
Cash and cash equivalents, December 31 (Note)	$ 2	$ 285	$ —	$ —	$ 287

Note: Cash and cash equivalents include highly liquid investments with a maturity of three months or less at the date of purchase.

14. Subsequent Events

Dividend

On February 7, 2018, our Board of Directors declared a cash dividend of $0.25 , payable on March 22, 2018 to shareholders of record as of March 6, 2018.

15. Quarterly Financial Data (Unaudited)

Quarter	Net Sales and Operating Revenues	Cost of Sales (Excluding Depreciation and Amortization)	Earnings Before Interest Expense, Income Taxes and Noncontrolling Interests	Net Income Attributable to Tenneco Inc.
	(Millions)			
2017				
1st	$ 2,292	$ 1,931	$ 121	$ 59
2nd	2,317	1,946	27	(3)
3rd	2,274	1,913	134	83
4th	2,391	2,022	135	68
	$ 9,274	$ 7,812	$ 417	$ 207
2016				
1st	$ 2,136	$ 1,770	$ 124	$ 57
2nd	2,212	1,816	171	82
3rd	2,096	1,743	150	179
4th	2,155	1,794	71	38
	$ 8,599	$ 7,123	$ 516	$ 356

Quarter	Basic Earnings per Share of Common Stock	Diluted Earnings per Share of Common Stock
2017		
1st	$ 1.10	$ 1.09
2nd	(0.05)	(0.05)
3rd	1.57	1.57
4th	1.33	1.33
Full Year	3.93	3.91
2016		
1st	$ 1.00	$ 0.99
2nd	1.44	1.43
3rd	3.22	3.19
4th	0.70	0.69
Full Year	6.36	6.31

Note: The sum of the quarters may not equal the total of the respective year’s earnings per share on either a basic or diluted basis due to changes in the weighted average shares outstanding throughout the year.

(The preceding notes are an integral part of the foregoing consolidated financial statements.)

SCHEDULE II

TENNECO INC. AND CONSOLIDATED SUBSIDIARIES

SCHEDULE II — VALUATION AND QUALIFYING ACCOUNTS

Description	Balance at Beginning of Year	Additions: Charged to Costs and Expenses	Additions: Charged to Other Accounts	Deductions	Balance at End of Year
			(Millions)		
Allowance for Doubtful Accounts and Notes Receivable Deducted from Assets to Which it Applies:					
Year Ended December 31, 2017	$ 16	1	—	1	$ 16
Year Ended December 31, 2016	$ 16	1	—	1	$ 16
Year Ended December 31, 2015	$ 16	4	—	4	$ 16

Description	Balance at Beginning of Year	Provision Charged (Credited) to Expense	Allowance Changes	Other Additions (Deductions) (a)	Balance at End of Year
			(Millions)		
Deferred Tax Assets- Valuation Allowance					
Year Ended December 31, 2017	$ 145	(1)	—	19	$ 163
Year Ended December 31, 2016	$ 127	18	—	—	$ 145
Year Ended December 31, 2015	$ 139	15	(3)	(24)	$ 127

(a) Related to changes in foreign currency exchange rates, primarily the euro, in 2017.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE.

None.

ITEM 9A. CONTROLS AND PROCEDURES.

Evaluation of Disclosure Controls and Procedures

An evaluation was carried out under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, of the effectiveness of our disclosure controls and procedures (as defined in Rule 13a-15(e) and Rule 15d-15(e) under the Securities Exchange Act of 1934, as amended (the Exchange Act)) as of the end of the quarter covered by this report. Based on that evaluation, our Chief Executive Officer and Chief Financial Officer concluded that, due to the material weakness in our internal control over financial reporting described in Management's Report on Internal Control Over Financial Reporting included in Item 8, the Company's disclosure controls and procedures were not effective as of December 31, 2017 to ensure that information required to be disclosed by our Company in reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in Securities and Exchange Commission rules and forms and such information is accumulated and communicated to management as appropriate to allow timely decisions regarding required disclosures.

See Item 8, "Financial Statements and Supplementary Data" for management's report on internal control over financial reporting and the report of our independent registered public accounting firm thereon.

Remediation Plan for Material Weakness in Internal Control over Financial Reporting

The Audit Committee engaged an independent legal firm to investigate these transactions and it concluded that such mischaracterizations were intentional. In particular, certain China personnel created accounting documentation for certain supplier transactions that was inconsistent with the substance of the transactions. With respect to these circumstances, the Company has taken action to dismiss the individuals who engaged in intentional misconduct.

Under the oversight of the Audit Committee and as part of our commitment to strengthening our internal control over financial reporting, we have implemented a number of actions since this material weakness was identified, including (i) strengthening the China accounting staff with personnel who have significant experience in U.S. and international financial reporting; (ii) additional training for China accounting and purchasing personnel; (iii) augmenting oversight with qualified personnel in the U.S. and Europe. The actions taken have not yet been fully evidenced; therefore, we concluded that this material weakness continued to exist as of December 31, 2017.

We will continue to monitor the effectiveness of these and other processes, procedures and controls and make any further changes management determines appropriate.

Changes in Internal Control Over Financial Reporting

There have been no changes in our internal control over financial reporting during the quarter ended December 31, 2017, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. OTHER INFORMATION.

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE.

The sections entitled "Election of Directors" and "Corporate Governance" in our definitive Proxy Statement for the Annual Meeting of Stockholders to be held May 16, 2018 are incorporated herein by reference. In addition, Item 4.1 of this Annual Report on Form 10-K, which appears at the end of Part I, is incorporated herein by reference.

A copy of our Code of Ethical Conduct for Financial Managers, which applies to our Chief Executive Officer, Chief Financial Officer, Controller and other key financial managers, is filed as Exhibit 14 to this Form 10-K. We have posted a copy of the Code of Ethical Conduct for Financial Managers on our Internet website at *www.tenneco.com* . We will make a copy of this code 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 requirement under Item 5.05 of Form 8-K and applicable NYSE rules regarding amendments to or waivers of our Code of Ethical Conduct by posting this information on our Internet website at *www.tenneco.com* .

ITEM 11. EXECUTIVE COMPENSATION.

The sections entitled "Executive Compensation" and "Compensation/Nominating/Governance Committee Report on Executive Compensation" in our definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2018 are incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS.

The section entitled "Ownership of Common Stock" in our definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2018 is incorporated herein by reference.

Securities Authorized for Issuance under Equity Compensation Plans

The following table shows, as of December 31, 2017 , information regarding outstanding awards available under our compensation plans (including individual compensation arrangements) under which our equity securities may be delivered:

Plan category	(a) Number of securities to be issued upon exercise of outstanding options, warrants and rights(1)	(b) Weighted-average exercise price of outstanding options, warrants and rights	(c) Number of securities available for future issuance (excluding shares in column (a))(1)
Equity compensation plans approved by security holders:			
Stock Ownership Plan(2)	3,237	$ 19.38	—
2006 Long-Term Incentive Plan (as amended)(3)	314,779	$ 21.24	2,374,879

(1) Reflects the number of shares of the Company's common stock. Does not include 213,195 shares that may be issued in settlement of common stock equivalent units that were (i) credited to outside directors as payment for their retainer and other fees or (ii) credited to any of our executive officers who have elected to defer a portion of their compensation. In general, these units are settled in cash. At the option of the Company, however, the units may be settled in shares of the Company's common stock.

(2) This plan terminated as to new awards upon adoption of our 2006 Long-term Incentive Plan (except awards pursuant to commitments outstanding on that date).

(3) Does not include 410,251 shares subject to outstanding restricted stock (vest over time) as of December 31, 2017 that were issued at a weighted average grant date fair value of $50.14. Under this plan, as of December 31, 2017 , a maximum of 1,593,879 shares remained available for delivery under full value awards (i.e., bonus stock, stock equivalent units, performance units, restricted stock and restricted stock units).

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE.

The subsections entitled "The Board of Directors and its Committees" and "Transactions with Related Persons" under the section entitled "Corporate Governance" in our definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2018 are incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES.

The sections entitled "Ratify Appointment of Independent Public Accountants — Audit, Audit-Related, Tax and All Other Fees" and "Ratify Appointment of Independent Public Accountants — Pre-Approval Policy" in our definitive Proxy Statement for the Annual Meeting of Stockholders to be held on May 16, 2018 are incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES.

CONSOLIDATED FINANCIAL STATEMENTS INCLUDED IN ITEM 8

See “Index to Financial Statements of Tenneco Inc. and Consolidated Subsidiaries” set forth in Item 8, “Financial Statements and Supplementary Data” for a list of financial statements filed as part of this Report.

INDEX TO SCHEDULE INCLUDED IN ITEM 8

SCHEDULES OMITTED AS NOT REQUIRED OR INAPPLICABLE

Schedule I — Condensed financial information of registrant
Schedule III — Real estate and accumulated depreciation
Schedule IV — Mortgage loans on real estate
Schedule V — Supplemental information concerning property — casualty insurance operations

EXHIBITS

The following exhibits are filed with this Annual Report on Form 10-K for the fiscal year ended December 31, 2017 , or incorporated herein by reference (exhibits designated by an asterisk are filed with the report; all other exhibits are incorporated by reference):

INDEX TO EXHIBITS

Exhibit Number		Description
2	—	None.
3.1(a)	—	Restated Certificate of Incorporation of the registrant dated December 11, 1996 (incorporated herein by reference to Exhibit 3.1(a) of the registrant's Annual Report on Form 10-K for the year ended December 31, 1997, File No. 1-12387).
3.1(b)	—	Certificate of Amendment, dated December 11, 1996 (incorporated herein by reference to Exhibit 3.1(c) of the registrant's Annual Report on Form 10-K for the year ended December 31, 1997, File No. 1-12387).
3.1(c)	—	Certificate of Ownership and Merger, dated July 8, 1997 (incorporated herein by reference to Exhibit 3.1(d) of the registrant's Annual Report on Form 10-K for the year ended December 31, 1997, File No. 1-12387).
3.1(d)	—	Certificate of Designation of Series B Junior Participating Preferred Stock dated September 9, 1998 (incorporated herein by reference to Exhibit 3.1(d) of the registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 1998, File No. 1-12387).
3.1(e)	—	Certificate of Elimination of the Series A Participating Junior Preferred Stock of the registrant dated September 11, 1998 (incorporated herein by reference to Exhibit 3.1(e) of the registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 1998, File No. 1-12387).
3.1(f)	—	Certificate of Amendment to Restated Certificate of Incorporation of the registrant dated November 5, 1999 (incorporated herein by reference to Exhibit 3.1(f) of the registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 1999, File No. 1-12387).
3.1(g)	—	Certificate of Amendment to Restated Certificate of Incorporation of the registrant dated November 5, 1999 (incorporated herein by reference to Exhibit 3.1(g) of the registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 1999, File No. 1-12387).
3.1(h)	—	Certificate of Ownership and Merger merging Tenneco Automotive Merger Sub Inc. with and into the registrant, dated November 5, 1999 (incorporated herein by reference to Exhibit 3.1(h) of the registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 1999, File No. 1-12387).
3.1(i)	—	Certificate of Amendment to Restated Certificate of Incorporation of the registrant dated May 9, 2000 (incorporated herein by reference to Exhibit 3.1(i) of the registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2000, File No. 1-12387).
3.1(j)	—	Certificate of Ownership and Merger merging Tenneco Inc. with and into the registrant, dated October 27, 2005 (incorporated herein by reference to Exhibit 99.1 of the registrant's Current Report on Form 8-K dated October 28, 2005, File No. 1-12387).
3.2	—	By-laws of the registrant, as amended October 11, 2016 (incorporated herein by reference to Exhibit 3.2 of the registrant's Current Report on Form 8-K event dated October 11, 2016, File No. 1-12387).
4.1	—	Specimen stock certificate for Tenneco Inc. common stock (incorporated herein by reference to Exhibit 4.3 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2006, File No. 1-12387).
4.2(a)	—	Fifth Amended and Restated Credit Agreement, dated as of May 12, 2017, amount Tenneco Inc., Tenneco Automotive Operating Company Inc., JPMorgan Chase Bank, N.A., as administrative agent, and the other lenders party thereto (incorporated herein by reference to Exhibit 4.1 of the registrant's Current Report on Form 8-K filed May 15, 2017, File No. 1-12387).
4.2(b)	—	Amended and Restated Guarantee and Collateral Agreement, dated as of May 12, 2017 (amending and restating the Guarantee and Collateral Agreement dated as of December 8, 2014, as previously amended and amended and restated), among Tenneco Inc., various of its subsidiaries and JPMorgan Chase Bank, N.A., as administrative agent (incorporated herein by reference to Exhibit 4.2 of the registrant's Current Report on Form 8-K filed May 15, 2017, File No. 1-12387).
4.3	—	Indenture, dated December 5, 2014, among the registrant, various subsidiaries of the registrant and U.S, Bank National Association, as trustee (incorporated herein by reference to Exhibit 4.1 of the registrant's Current Report on Form 8-K filed December 5, 2014, File No. 1-12387).
4.4	—	First Supplemental Indenture, dated December 5, 2014, among the registrant, various subsidiaries of the registrant and U.S. Bank National Association, as trustee (incorporated herein by reference to Exhibit 4.2 of the registrant's Current Report on Form 8-K filed December 5, 2014, File No. 1-12387).

Exhibit Number		Description
4.5	—	Second Supplemental Indenture, dated as of June 13, 2016, among Tenneco Inc., the guarantors named therein and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.1 to the registrant's Current Report on Form 8-K dated June 13, 2016, File No. 1-12387).
4.6	—	The registrant is a party to other agreements for unregistered long-term debt securities, which do not exceed 10% of the registrant's total assets. The registrant agrees to furnish a copy of such agreements to the Commission upon request.
9	—	None.
+10.1	—	Stock Ownership Plan (incorporated herein by reference to Exhibit 10.14 of the registrant's Registration Statement on Form S-4, Reg. No. 333-93757).
+10.2	—	Deferred Compensation Plan (incorporated herein by reference to Exhibit 10.12 of the registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2000, File No. 1-12387).
+10.3	—	Supplemental Executive Retirement Plan (incorporated herein by reference to Exhibit 10.13 of the registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2000, File No. 1-12387).
+10.4	—	Form of Indemnity Agreement entered into between the registrant and Paul Stecko (incorporated herein by reference to Exhibit 10.29 of the registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 2000, File No. 1-12387).
+10.5	—	Amendment No. 1 to Deferred Compensation Plan (incorporated herein by reference to Exhibit 10.27 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2002, File No. 1-12387).
+10.6	—	Amendment No. 1 to the Supplemental Executive Retirement Plan (incorporated herein by reference to Exhibit 10.40 of the registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2005, File No. 1-12387).
+10.7	—	Amendment No. 2 to the Deferred Compensation Plan (incorporated herein by reference to Exhibit 10.42 of the registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2005, File No. 1-12387).
+10.8	—	Supplemental Retirement Plan (incorporated herein by reference to Exhibit 10.43 of the registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2005, File No. 1-12387).
+10.9	—	Amended and Restated Value Added ("TAVA") Incentive Compensation Plan, effective January 1, 2006 (incorporated herein by reference to Exhibit 10.47 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2005, File No. 1-12387).
+10.10	—	Form of First Amendment to the Tenneco Inc. Supplemental Retirement Plan (incorporated herein by reference to Exhibit 10.57 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2006, File No. 1-12387).
+10.11	—	Tenneco Inc. Change in Control Severance Benefit Plan for Key Executives, as Amended and Restated effective December 12, 2007 (incorporated herein by reference to Exhibit 10.61 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2008, File No. 1-12387).
+10.12	—	Code Section 409A Amendment to Supplemental Retirement Plan (incorporated herein by reference to Exhibit 10.71 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2008, File No. 1-12387).
+10.13	—	Code Section 409A Amendment to Amended and Restated Value Added ("TAVA") Incentive Compensation Plan (incorporated herein by reference to Exhibit 10.73 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2008, File No. 1-12387).
+10.14	—	Tenneco Inc. 2006 Long-Term Incentive Plan (as amended and restated effective March 11, 2009) (incorporated herein by reference to Appendix A of the registrant's proxy statement on Schedule 14A, filed with the Securities and Exchange Commission on March 31, 2009, File No. 1-12387).
+10.15	—	Amendment No. 2, effective January 15, 2010, to Amended and Restated Tenneco Value Added Incentive Compensation Plan (incorporated herein by reference to Exhibit 10.70 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2009, File No. 1-12387).
+10.16	—	First Amendment to Tenneco Inc. Change in Control Severance Benefit Plan for Key Executives, as Amended and Restated effective December 12, 2007 (incorporated herein by reference to Exhibit 10.3 of the registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2011, File No. 1-12387).
+10.17	—	Form of Non-Qualified Stock Option Agreement for Employees under Tenneco Inc. 2006 Long-Term Incentive Plan (incorporated herein by reference to Exhibit 10.3 of the registrant's Current Report on Form 8-K dated January 18, 2012, File No. 1-12387).
+10.18	—	Letter Agreement between Tenneco Inc. and Gregg M. Sherrill (incorporated herein by reference to Exhibit 99.2 of the registrant's Current Report on Form 8-K dated as of January 5, 2007. File No. 1-12387).
+10.19	—	Letter Agreement between Tenneco Inc. and Gregg M. Sherrill, dated as of January 15, 2007 (incorporated herein by reference to Exhibit 99.1 of the registrant's Current Report on Form 8-K dated as of January 15, 2007, File No. 1-12387).
+10.20	—	Code Section 409A Amendment to Letter Agreement between the registrant and Gregg M. Sherrill (incorporated herein by reference to Exhibit 10.74 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2008, File No. 1-12387).

Exhibit Number		Description
+10.21	—	Tenneco Inc. Executive Bonus Plan (incorporated herein by reference from Exhibit 99.1 of the registrant's Current Report on Form 8-K dated as of January 15, 2014. File No. 1-12387).
+10.22	—	Amended and Restated Tenneco Inc. 2006 Long-Term Incentive Plan (effective March 18, 2013) (incorporated by reference to Appendix A of the Company's Proxy Statement on Schedule 14A, filed with the Securities Exchange Commission on April 3, 2013).
+10.23	—	Form of Restricted Stock Unit Award Agreement under the Tenneco Inc. 2006 Long-Term Incentive Plan (awards after May 21, 2013 and before February 2017) (incorporated herein by reference to Exhibit 10.3 of the registrant’s Current Report on Form 8-K filed May 21, 2013, File No. 1-12387).
+10.24	—	Form of Stock Option Award Agreement under the Tenneco Inc. 2006 Long-Term Incentive Plan (awards after May 21, 2013 and before February 2017) (incorporated herein by reference to Exhibit 10.4 of the registrant’s Current Report on Form 8-K filed May 21, 2013, File No. 1-12387).
+10.25	—	Form of Long-Term Performance Unit Award Agreement under the Tenneco Inc. 2006 Long-Term Incentive Plan (grants after January 14, 2014 and before February 2017) (incorporated herein by reference to Exhibit 99.2 of the registrant’s Current Report on Form 8-K filed January 15, 2014, File No. 1-12387).
+10.26	—	Offer Letter to Brian J. Kesseler dated January 6, 2015 (incorporated herein by reference to Exhibit 10.67 of the registrant's Annual Report on Form 10-K for the year ended December 31, 2014, File No. 1-12387).
+10.27	—	Tenneco Inc. Excess Benefit Plan (as amended and restated effective as of January 1, 2013) (incorporated by reference to Exhibit 10.5 of Tenneco Inc.'s Quarterly Report on Form 10-Q for the quarter ended June 30, 2013, File No. 1-12387).
+10.28	—	First Amendment to Amended and Restated Tenneco Inc. Excess Benefit Plan (amendment effective as of January 6, 2015) (incorporated by reference to Exhibit 10.5 of Tenneco Inc.'s Quarterly Report on Form 10-Q for the quarter ended March 31, 2015, File No. 1-12387).
+10.29	—	Second Amendment to Tenneco Inc. Change in Control Severance Benefit Plan for Key Executives (incorporated by reference to Exhibit 10.1 of registrant's Current Report on form 8-K dated April 28, 2015, File No. 1.12387).
+10.30	—	Form of Restricted Stock Award for Brian J. Kesseler (January 2015 replacement grant) under Tenneco Inc. 2006 Long-Term Incentive Plan (incorporated herein by reference to Exhibit 10.71 of the registrant's Annual Report on Form 10-K for the year ended December 31,2014, File No. 1-12387).
+10.31	—	Tenneco Inc. Deferred Compensation Plan (as Amended and Restated Effective as of August 1, 2013) (incorporated by reference to Exhibit 10.6 of Tenneco Inc.'s Quarterly Report on Form 10-Q for the quarter ended June 30, 2013, File No. 1-12387).
+10.32	—	Tenneco Inc. Incentive Deferral Plan (as Amended and Restated Effective as of August 1, 2013) (incorporated by reference to Exhibit 10.7 of Tenneco Inc.'s Quarterly Report on Form 10-Q for the quarter ended June 30, 2013, File No. 1-12387).
+10.33	—	Amendment No. 1 to Tenneco Inc. 2006 Long-Term Incentive Plan, effective October 10, 2016 (incorporated herein by reference to Exhibit 10.2 to the registrant’s Quarterly Report on Form 10-Q for the quarter ended September 30, 2016, File No. 1-12387).
+10.34	—	Notice to Employees of Agreement Amendments and New Options for Withholding, effective October 10, 2016 (incorporated herein by reference to Exhibit 10.5 to the registrant’s Quarterly Report on Form 10-Q for the quarter ended September 30, 2016, File No. 1-12387).
+10.35	—	Form of Restricted Stock Award Agreement for Employees under Tenneco Inc. 2006 Long-Term Incentive Plan (for awards commencing February 2017) (incorporated herein by reference to Exhibit 10.78 to the registrant's Annual Report on Form 10-K for the year ended December 31, 2016, File No. 1-12387).
+10.36	—	Form of Long-Term Performance Unit Award Agreement for Employees under Tenneco Inc. 2006 Long-Term Incentive Plan (for awards commencing February 2017) (incorporated herein by reference to Exhibit 10.79 to the registrant's Annual Report on Form 10-K for the year ended December 31, 2016, File No. 1-12387).
+10.37	—	First Amendment, dated as of May 31, 2017, under the Fifth Amended and Restated Credit Agreement amount Tenneco Inc., Tenneco Automotive Operating Company Inc., JPMorgan Chase Bank, N.A., as administrative agent, and the other lenders party thereto (incorporated herein by reference to Exhibit 4.3 of the registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2017, File No. 1-12387).
+10.38	—	Amendment No. 3, effective October 26, 2017, to Amended and Restated Tenneco Value Added Incentive Compensation Plan (incorporated herein by reference to Exhibit 10.1 of the registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 2017, File No. 1-12387).
+10.39	—	Tenneco Inc. Annual Incentive Plan (incorporated herein by reference to Exhibit 10.1 of the registrant’s Current Report on Form 8-K filed February 9, 2018. File No. 1-12387).
+10.40	—	Form of Restricted Stock Unit Award Agreement under the Tenneco Inc. 2006 Long-Term Incentive Plan (grants after 2017) (incorporated herein by reference to Exhibit 10.2 of the registrant’s Current Report on Form 8-K filed February 9, 2018. File No. 1-12387).

Exhibit Number		Description
+10.41	—	Form of Performance Share Unit Award Agreement under the Tenneco Inc. 2006 Long-Term Incentive Plan (grants after 2017) (incorporated herein by reference to Exhibit 10.3 of the registrant's Current Report on Form 8-K filed February 9, 2018. File No. 1-12387).
*+10.42	—	Tenneco Automotive Operating Company Inc. Severance Benefit Plan.
*+10.43	—	Offer Letter to Jason M. Hollar dated April 18, 2017.
*+10.44	—	Offer Letter to Gregg A. Bolt dated December 6, 2012.
*+10.45	—	Amendment dated June 12, 2013 to Offer Letter to Gregg A Bolt.
*+10.46	—	Offer Letter to Patrick Guo dated March 26, 2007.
*+10.47	—	Amendment dated February 29, 2012 to Offer Letter to Patrick Guo.
*+10.48	—	Tenneco Inc. Incentive Deferral Plan.
*+10.49	—	Tenneco Inc. Excess Benefit Plan.
11	—	None.
*12	—	Computation of Ratio of Earnings to Fixed Charges.
13	—	None.
14	—	Tenneco Inc. Code of Ethical Conduct for Financial Managers (incorporated herein by reference from Exhibit 99.3 to the registrant's Annual Report on Form 10-K for the year ended December 31, 2002, File No. 1-12387).
16	—	None.
18	—	None.
*21	—	List of Subsidiaries of Tenneco Inc.
22	—	None.
*23.1	—	Consent of PricewaterhouseCoopers LLP.
*24	—	Powers of Attorney.
*31.1	—	Certification of Brian J. Kesseler under Section 302 of the Sarbanes-Oxley Act of 2002.
*31.2	—	Certification of Kenneth R. Trammell under Section 302 of the Sarbanes-Oxley Act of 2002.
*32.1	—	Certification of Brian J. Kesseler and Kenneth R. Trammell under Section 906 of the Sarbanes-Oxley Act of 2002.
33	—	None.
34	—	None.
35	—	None.
99	—	None.
100	—	None.
101	—	None.
*101.INS	—	XBRL Instance Document.
*101.SCH	—	XBRL Taxonomy Extension Schema Document.
*101.CAL	—	XBRL Taxonomy Extension Calculation Linkbase Document.
*101.DEF	—	XBRL Taxonomy Extension Definition Linkbase Document.
*101.LAB	—	XBRL Taxonomy Extension Label Linkbase Document.
*101.PRE	—	XBRL Taxonomy Extension Presentation Linkbase Document.

* Filed herewith.

\+ Indicates a management contract or compensatory plan or arrangement.

ITEM 16. FORM 10-K SUMMARY.

Not applicable.

SIGNATURES

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

TENNECO INC.

By /S/ BRIAN J. KESSELER

Brian J. Kesseler

Chief Executive Officer

Date: February 28, 2018

Pursuant to the requirements of the Securities Exchange Act of 1934 this report has been signed by the following persons in the capacities indicated on February 28, 2018.

Signature	Title
* Gregg M. Sherrill	Executive Chairman and Director
/S/ BRIAN J. KESSELER Brian J. Kesseler	Chief Executive Officer and Director (principal executive officer)
/S/ KENNETH R. TRAMMELL Kenneth R. Trammell	Executive Vice President and Chief Financial Officer (principal financial officer)
* Paul D. Novas	Vice President and Interim Controller (principal accounting officer)
* Thomas C. Freyman	Director
* Dennis J. Letham	Director
* James S. Metcalf	Director
* Roger B. Porter	Director
* David B. Price, Jr.	Director
* Paul T. Stecko	Director
* Jane L. Warner	Director
* Roger J. Wood	Director

*BY: /S/ KENNETH R. TRAMMELL

Kenneth R. Trammell

Attorney in fact

Exhibit 10.42

TENNECO AUTOMOTIVE OPERATING COMPANY INC.
SEVERANCE BENEFIT PLAN
(Amended and Restated Effective as of August 1, 2015)

1. Purpose of the Plan

Tenneco Automotive Operating Company Inc. established this Severance Benefit Plan (the "Plan") to grant severance benefits to eligible employees who are involuntarily terminated due to a reduction in force or layoff. This document serves as both the summary plan description (SPD) and official plan document for the Severance Benefit Plan.

2. Definitions

a. "Company" means Tenneco Automotive Operating Company Inc.

b. "Continuous Service" means continuous service as an active Employee of a Tenneco Company including service prior to November 5, 1999 with any affiliate or subsidiary of Tenneco Inc. as it existed on August 1, 1996 determined in the sole discretion of the Plan Administrator by any method for determining applicable service in an equitable and non-discriminatory manner. No service will be counted that would otherwise produce a duplication of benefits under this Plan.

c. "Employee" means a U.S. salaried, regular, full-time employee of a Participating Company, but only if so classified by the Participating Company in accordance with its policies and practices.

d. "Participating Company" means Tenneco Automotive Operating Company Inc. and all of its U.S. subsidiaries.

e. "Severance Benefit" has the meaning set forth in Section 5, below.

f. "Tenneco Company" means the Company and any other entity in which the Company has at least a 50% ownership interest.

g. "Week of Pay" means the Employee's base annualized salary as of his termination divided by 52. This does not include any benefits, bonuses, shift differentials, performance awards, or other special pay additions. Further, any salary reductions for benefits or thrift plan contributions are excluded from Week of Pay determinations. For commissioned sales positions, the Week of Pay determination will be adjusted to provide for an incentive target amount (determined at the sole discretion of the Company).

3. Effective Date

Provisions of this restated Plan are effective for Employees terminating on or after August 1, 2015. This Plan replaces and supersedes the prior plan, which was effective as of September 1, 2003.

4. **Eligibility**

All Employees with at least one month of Continuous Service are eligible to receive a Severance Benefit under the Plan if they meet all of the following conditions:

a. are notified in writing of involuntary termination of employment because of lack of available work, relocation of his or her job to a worksite that is more than 100 miles further from his or her current worksite, or other reduction in force and are terminated as a result thereof;

b. have no determinable callback or return date;

c. have signed and returned a general release and such other documents as the Company shall require (without subsequent revocation of that release);

d. actually terminate employment in accordance with the timing and/or conditions set forth by the Company in the notice of termination; and

e. are not deemed ineligible under Section 11 below.

Employees whose hours of work, wages and other conditions of employment are governed by the provisions of a collective bargaining agreement are not eligible unless the collective bargaining agreement expressly provides for employees' coverage in this Plan (provided that such employees remain subject to the requirements of subsections (a) through (e) above as well as all other terms and conditions of this Plan).

5. **Severance Benefit**

The term "Severance Benefit" means

a. The cash payment provided for under this Section 5, or, as determined at the sole discretion of the Company, those benefits provided under any Special Appendix[1] attached hereto. The amount of the Severance Benefit (expressed in terms of Weeks of Pay) will be based upon the length of the Employee's Continuous Service with the Company in accordance with the following schedule. The Severance Benefit is a payment equal to the total of the applicable entries in (a) plus (b) below:

(i) One Week of Pay for each full year of Continuous Service up to and including 15 years;

(ii) 1.5 Weeks of Pay for each full year of Continuous Service exceeding 15 years.

However, in no event will the total severance payment ((i) + (ii) above) be less than 4 Weeks of Pay or greater than 52 Weeks of Pay. For example, an employee in his 20th year of Continuous Service would receive 15 Weeks of Pay for the first 15 years of Continuous Service and 7.5 Weeks of Pay for the 16th through 20th year of Continuous Service.

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1 From time to time, the Company may amend this Plan to add a Special Appendix to account for special benefit provisions applicable to a particular reduction in force.

b. If enrolled in the applicable plan at the date of termination, continuation of medical and dental benefits for a period that equals the time interval set forth in
a. above that is used to calculate the cash payment.

c. Outplacement services in accordance with, and subject to the limits of, the Company's outplacement policy, as amended from time to time. A Participant will be advised of outplacement benefits at time of separation.

The Company may, in its discretion on a case by case basis, enhance the benefits provided pursuant to the Plan.

6. Method of Payment

Except as otherwise provided in any applicable Special Appendix, the cash portion of the Severance Benefit will be paid in equal semi-monthly installments beginning as soon as administratively feasible after the revocation period specified in the release has expired. At the Company's discretion, provided it is determined prior to the date of separation, payment in a lump sum may be made in lieu of semi-monthly installments. Appropriate withholdings and deductions will be made.

7. Non-Assignment of Severance Benefit

The Severance Benefit cannot be assigned, transferred or sold to anyone else and cannot be used as collateral for loans or pledged in payment of debts, contracts, or any other liability.

8. Agent for Service of Process

Legal process may be served on the Plan Administrator:

Tenneco Automotive Operating Company Inc.

Attention: Senior Vice President and General Counsel
500 North Field Drive
Lake Forest, Illinois 60045

9. Plan Amendment

The Plan may be terminated or amended at any time by the Company, provided that the Plan benefit for an eligible employee who has signed the release form and returned it to the Plan Administrator within the time specified therein will not be adversely affected.

10. Plan Year

The plan year for reporting to governmental agencies and employees shall be the calendar year.

11. Ineligibility

An Employee is not eligible to receive any benefit under this Plan if:

a. the Employee's termination is for a reason other than involuntary termination from a Participating Company due to a workforce reduction as described in

Section 4(a) (employees who terminate voluntarily or are discharged for misconduct or poor performance are not eligible);

b. the Employee does not sign and return the release form and all other documents as the Company shall require within the prescribed time limit;

c. the Employee revokes the release agreement within the time permitted under that agreement;

d. the Plan is terminated (or otherwise amended to eliminate a benefit with respect to that Employee) before the Employee's termination of employment;

e. the Employee has been offered employment at the same or greater base salary with a Tenneco Company and with a principal place of work at a location which is no more than 100 miles further from the Employee's primary residence than is his/her current principal place of work;

f. the Employee has been offered employment, regardless of level of pay or benefits, with any other entity as arranged by the Company, including without limitation, in connection with any purchase of any Participating Company's business or assets, any outsourcing arrangement, or any arrangement to transfer employees or business to a customer, supplier or other entity doing business with the Company or its affiliates, or any similar transaction or arrangement;

g. the Employee is covered under any other severance plan or is eligible for any type of severance or termination benefit with respect to this termination provided by the Company or any other entity, other than government-provided unemployment compensation; or

h. the Employee's employment terminates pursuant to any of the following:

   1) voluntary termination of employment or retirement or resignation of employment before a job-end date that has been specified by the Company;

   2) while under a Company short-term or long-term disability plan or program, including failure to return from a period of receiving STD/ LTD or FMLA leave;

   3) mandatory retirement due to Company policies or legal requirement;

   4) willful misconduct or activity deemed actually or potentially detrimental to the interests of the Company, which may include, but is not limited to, dishonesty; theft; violation of one or more Company policies (such as those relating to alcohol or drugs, harassment, workplace violence, etc.) or safety rules or procedures;

   5) unauthorized disclosure of confidential information;

   6) conduct inconsistent with any applicable law or regulation; or other serious misconduct;

7) willful failure or refusal to substantially perform job responsibilities (other than any such failure resulting from incapacity due to disability), including but not limited to unsatisfactory performance;

8) excessive absenteeism under the applicable Company attendance policy; or

9) any act or omission causing, or having potential to cause, significant harm or loss to the Company, its officers and/or employees.

i. the Employee receives more than one month's advance notice of lack of work or job elimination, but only to the extent of such advance notice (e.g., an Employee who is eligible for six months of severance but receives four months of advance notice is eligible for two months of the Severance Benefit).

12. Effect of Death on Benefit

If an Employee dies on or before his termination date, no benefit will be paid under this Plan. If an eligible Employee dies after his termination date, and before he receives the Severance Benefit, payment will be made to his/her estate (provided that such eligible Employee otherwise met all of the requirements of Section 4, including without limitation Section 4 (c)).

13. Forfeiture

If the Employee violates the release or any confidentiality, non-competition and/or non-solicitation agreement with the Company or if, after Employee's termination of employment, facts are disclosed or discovered that would have constituted termination for cause, as described above, then Employee forfeits any and all rights to benefits under this Plan, and, to the extent benefits have been paid to Employee under this Plan, Employee must repay the full amount within 15 days of receiving written notification from the Plan Administrator.

14. Offset

Each Participating Company reserves the right to deduct any amount Employee owes to it or to the Company for any reason from any severance benefits payable to Employee, up to the extent permitted by law, including, but not limited to, plan premiums, borrowed vacation days, loans and/or relocation obligations. Any reduction shall be considered a reduction in benefits; provided, however, that Employee may be required to pay applicable taxes on the amount deducted.

15. Funding

Each Participating Company shall pay the benefits under this Plan out of its general assets at the time the benefits are to be paid. There shall be no special fund out of which benefits shall be paid, nor shall Plan participants be required to make a contribution as a condition of receiving benefits.

16. Named Fiduciary and Plan Administrator

a. The Company is hereby designated as the "named fiduciary" and Plan Administrator of this Plan and has the authority to control and manage the operation of the Plan.

b. The Plan Administrator shall make all determinations as to the right of any person to a Severance Benefit and shall have the discretionary authority to construe and interpret the provisions of the Plan and make factual determinations thereunder, including the power to determine the rights or eligibility of any persons, and the amounts of their benefits under the Plan, and to remedy ambiguities, inconsistencies or omissions, and any such determinations shall be binding on all parties. Benefits will only be paid if the Plan Administrator, in its sole discretion, determines that the employee or beneficiary is entitled to them.

17. Plan Sponsor

The Plan sponsor is the Company,

Tenneco Automotive Operating Company Inc.

500 North Field Drive
Lake Forest, Illinois 60045

18. Claim Denials

a. How to Submit a Claim

In order to claim benefits under this Plan, the employee must sign the approved release form and any other forms required under this Plan and return them on a timely basis to the Plan Administrator.

Tenneco Automotive Operating Company Inc.
Attn: Vice President Total Rewards
500 North Field Drive
Lake Forest, Illinois 60045

b. If You Disagree

If you have made a claim for benefits under this Plan and any portion of the claim is denied, the Plan Administrator will furnish you with a written notice stating the specific reasons for the denial, specific reference to pertinent Plan provisions upon which the denial was based, a description of any additional information or material necessary to perfect the claim, an explanation of why such information or material is necessary and appropriate information concerning steps to take if you wish to submit the claim for review.

Your claim will be deemed denied if the Plan Administrator does not approve the claim and fails to notify you within 90 days after receipt of your claim, plus any extension of time for processing the claim not to exceed 90 additional days, as special circumstances require. To obtain an extension, the Plan Administrator must advise you in writing during the initial 90 days that an extension is necessary, stating the special circumstances requiring the extension and the date by which you can expect the Plan Administrator's decision regarding your claim.

c. <u>Review Procedure</u>

Within 60 days after the date of written notice denying any benefits, you or your authorized representative may write to the Plan Administrator requesting a review of that decision.

Your request for review may contain such issues and comments as you wish considered in the review. You may also review pertinent documents in the Plan Administrator's possession. The Plan Administrator will make a final determination with respect to your claim as soon as practicable. The Plan Administrator will advise you of the determination in writing and will set forth the specific reasons for the determination and the specific references to any pertinent Plan provisions upon which the determination is based.

Your claim will be deemed denied on review if the Plan Administrator fails to give you written notice of final determination within 60 days after receipt of your request for review, plus any extension of time for completing the review, not to exceed 60 additional days, as special circumstances require.

To obtain an extension, the Plan Administrator must advise you in writing during the initial 60 days if any extension is necessary, stating the special circumstances requiring the extension and the date by which you can expect the Plan Administrator's decision regarding the review of your claim.

19. <u>Your Rights</u>

As a participant in the Plan, you are entitled to certain rights and protections under the Employee Retirement Income Security Act of 1974 ("ERISA").
ERISA provides that all Plan participants shall be entitled to:

Receive Information About Your Plan and Benefits

- Examine, without charge, at the plan administrator’s office and at other specified locations, such as worksites, all documents governing the plan, including copies of the latest annual report (Form 5500 Series) filed by the plan with the U.S. Department of Labor and available at the Public Disclosure Room of the Employee Benefits Security Administration.
- Obtain, upon written request to the plan administrator, copies of documents gov erning the operation of the plan, including copies of the latest annual report (Form 5500 Series) and updated summary plan description. The administrator may make a reasonable charge for the copies.

- Receive a summary of the plan's annual financial report. The plan administrator is required by law to furnish each participant with a copy of this summary annual report.

Prudent Actions by Plan Fiduciaries

In addition to creating rights for plan participants, ERISA imposes duties upon the people who are responsible for the operation of the employee benefit plan. The people who operate your plan, called "fiduciaries" of the plan, have a duty to do so prudently and in the interest of you and other plan participants and beneficiaries. No one, including your employer or any other person, may fire you or otherwise discriminate against you in any way to prevent you from obtaining a pension or welfare benefit or exercising your rights under ERISA.

Enforce Your Rights

If your claim for a welfare benefit is denied or ignored, in whole or in part, you have a right to know why this was done, to obtain copies of documents relating to the decision without charge, and to appeal any denial, all within certain time schedules.

Under ERISA, there are steps you can take to enforce the above rights. For instance, if you request a copy of plan documents or the latest annual report from the plan and do not receive them within 30 days, you may file suit in a Federal court. In such a case, the court may require the plan administrator to provide the materials and pay you up to $110 a day until you receive the materials, unless the materials were not sent because of reasons beyond the control of the administrator. If you have a claim for benefits which is denied or ignored, in whole or in part, you may file suit in a state or Federal court.

If it should happen that plan fiduciaries misuse the plan's money, or if you are discriminated against for asserting your rights, you may seek assistance from the
U.S. Department of Labor, or you may file suit in a Federal court. The court will decide who should pay court costs and legal fees. If you are successful the court may order the person you have sued to pay these costs and fees. If you lose, the court may order you to pay these costs and fees, for example, if it finds your claim frivolous.

Assistance with Your Questions

If you have any questions about your plan, you should contact the Plan Administrator. If you have any questions about this statement or about your rights under ERISA, or if you need assistance in obtaining documents from the plan administrator, you should contact the nearest office of the Employee Benefits Security Administration, U.S. Department of Labor, listed in your telephone directory or:

Division of Technical Assistance & Inquiries Employee Benefits Security Administration
U.S. Department of Labor
200 Constitution Avenue, N.W. Washington, D.C., 20210

You may also obtain certain publications about your rights and responsibilities under ERISA by calling the publications hotline of the Employee Benefits Security Administration at (866) 444-EBSA.

20. Controlling Law

This Plan and the release shall be interpreted under the laws of the State of Illinois, except to the extent that federal law preempts.

21. Delegation.

The Company has the authority to delegate any of its powers under this Plan to any other person, persons, or committee. This person, persons, or committee may further delegate its reserved powers to another person, persons, or committee as they see fit. Any delegation or subsequent delegation shall include the same full, final and discretionary authority that the Company has listed herein and any decisions, actions or interpretations made by any delegate shall have the same ultimate binding effect as if made by the Company.

IN WITNESS WHEREOF, and as conclusive evidence of the adoption of the foregoing, the Company, a Delaware corporation, has caused these presents to be duly executed by its proper officers thereunto duly authorized on this 1st day of August 2015.

TENNECO AUTOMOTIVE OPERATING COMPANY INC.

By: /s/ Gregg A. Bolt
Name: Gregg A. Bolt
Title: Senior Vice President Global Human Resources and Administration

EXHIBIT 10.43

REVISED

April 14, 2017

Mr. Jason M. Hollar
5N211 Wilton Croft Road
St. Charles, IL 60175

Dear Jason:

I am pleased to provide for your consideration this letter offering employment to be Tenneco's Senior Vice President Finance.

The key terms of Tenneco's offer of employment are described below. Outline of Employment Offer

1. **Position:** As an executive officer, your position will be Senior Vice President Finance, reporting directly to Ken Trammell, Executive Vice President and Chief Financial Officer.

2. **Base Salary:** Your initial base salary will be $500,000 per year ($41,666.67 per month) less appropriate taxes and withholding, paid in accordance with Tenneco's normal payroll practices. Beginning in 2018 and each year thereafter, your base salary will be reviewed and, in turn, may be adjusted, subject to approval by the Compensation, Nominating and Governance Committee of Tenneco Inc.'s Board of Directors (the "CNG Committee").

3. **Annual Incentive Compensation** : You will be eligible to participate in Tenneco's executive annual incentive plan in a manner consistent with other Tenneco executives. The terms of the annual incentive plan are set forth in the Tenneco Value Added Incentive Compensation Plan ("TAVA Plan - copy attached). Your initial target bonus opportunity for the 2017 calendar year performance period under the TAVA Plan will be 75% of your annual base salary (or $375,000 based on the offered salary with no proration). The payment of an annual incentive to you is subject to achievement of pre-defined performance goals for the Company, the approval by the CNG Committee, as well as the terms of the TAVA Plan (or successor plan).

4. **Long-Term Incentive Compensation:** You will be eligible to participate in Tenneco's long-term incentive plan in a manner consistent with other Tenneco executives. The terms of the long-term incentive plan are set forth in the Tenneco Long-Term Incentive Plan, as amended ("LTIP"), a copy of which has been attached.

   Each year the CNG Committee will determine and approve the mix of long-term incentive (LTI) awards that will be granted to you and the aggregate target value of these awards.
   Your first eligibility for a full LTI award will be in February 2018. The final award size, performance conditions and other terms of this award will be approved by the CNG Committee in February 2018 at the same time the terms of these awards are established for other executives at the Company. Your 2018 LTI award is currently estimated to have a $1,000,000 value, granted 50% as restricted shares with a 3-year ratable vesting and 50% Long-Term Performance Units (LTPUs) with a 3-year performance measurement period.

   You will be eligible to participate in the outstanding 2017 restricted stock awards with a value of $300,000. The number of shares will be based on a 10-trading day stock price average of Tenneco Inc. as of the 10 trading days preceding your hire date. You will also be eligible to participate in the outstanding 2016-2018 LTPU award cycle with a target award of$250,000 and the outstanding 2017-2019 LTPU award cycle with a target award of $300,000, subject to the performance goals and other criteria that were set for each of these two performance cycles and will be communicated in the award agreements.

5. **Replacement of Foregone Compensation:** To replace the value of foregone compensation from your previous employer, Tenneco will grant you a Restricted Stock Award of $300,000 vesting on your first anniversary of your hire date. The number of shares will be based on a 10-trading day stock price average of Tenneco Inc. as of April 26, 2017. This Restricted Stock Award will immediately vest if you are terminated without cause by Tenneco. In addition, you will be eligible to receive a $150,000 cash payment, less appropriate taxes and withholding, payable within 30 days of hire date.

   To replace the value of foregone 2017 and 2018 Long-Term Incentive Cash awards from your previous employer, you will be eligible to receive a $200,000 cash payment, less appropriate taxes and withholding, payable on December 15, 2017 and December 17, 2018.

6. **Retirement Plans:** You will be eligible to participate in Tenneco's 401(k) Plan that provides a 100% company match on your first 3%, and 50% of your next 2%, of base pay contributions subject to Plan and IRS maximums. In addition, you will receive a 2% of base pay contribution into the 40I(k) Plan after one year of service.

   You will also be eligible to immediately participate in Tenneco's Excess Benefit Plan that provides a 2% of base pay company contribution after IRS compensation maximums have been reached, and a company contribution equal to 2% of TAVA Plan bonus paid.

7. **Change-In-Control (CIC) Protection:** You will be eligible to participate in Tenneco's Change-In-Control Severance Benefit Plan for Key Executives. Benefits under the Plan are payable if you are discharged (either actually or constructively) within two years after change-in-control that includes a lump-sum payment equal to two times base salary and targeted annual bonus in effect immediately prior to the change-in-control.

8. **Severance (not related to CIC):** Unless and until you become Tenneco's Chief Financial Officer, if (A) your employment is involuntarily terminated for a reason other than "Cause" (meaning (i) fraud, embezzlement. or theft in connection with your employment, (ii) gross negligence in the performance of your duties, or (iii) conviction, guilty plea, or plea of nolo contender with respect to a felony or (B) you experience a material decrease in your job responsibilities or compensation, you will be entitled to receive a severance payment in a lump sum equal to one times your base salary and target annual bonus, subject to your execution of a general release and such other documents as the company may reasonably request. Upon a change to Chief Financial Officer, you will be eligible to participate in Tenneco's Severance Benefit Plan that applies to all U.S. salaried, full-time employees.

9. **Stock Ownership Guidelines:** Upon employment, you will be subject to Tenneco's stock ownership guideline policy, requiring that you hold qualifying shares of Tenneco Inc. equal to three times base salary. to be attained within five years of your employment date.

10. **Insider Trading Policy:** Upon employment. you will be subject to Tenneco's Insider Trading Policy, which, among other things, limits the timing and types of transactions you may make with respect to Tenneco securities and related derivatives.

11. **Health, Welfare and Retirement Benefits:** You will be eligible to participate in Tenneco's broad-based health, welfare and defined contribution retirement plans in a manner consistent with other Tenneco executives. Please refer to benefit plan documents for specific terms and eligibility. The Company reserves the right to change these benefit programs and any of our other benefit programs. Attached for your convenience is the Tenneco 2017 Benefits At A Glance for Salaried Employees.

12. **Vacation and Holiday Paid Time Off:** You will be entitled to four weeks of paid vacation per year in accordance with the provisions of the Company's vacation policy. In addition, the Company is typically closed during the week between Christmas and New Year's Day holidays. You will also be eligible for paid holidays and personal floating holidays in accordance with the Company's policies. However, if you leave employment with Tenneco, your accrued unused vacation will be paid in accordance with our vacation policy. Vacation is prorated to your date of hire and accrued on a monthly basis.

13. **Employment at Will:** This offer does not constitute a contract of employment for any specific period of time, but will create an employment at-will relationship that may be terminated at any time by you or the Company, with or without cause.

In addition, your offer is contingent upon the verification of the information you have provided to the company, successful completion of employment paperwork, the completion of a Combined Disclosure Notice & Authorization Regarding Background Consumer Reports and background authorization forms and execution of the Tenneco Confidentiality Agreement (this will be part of your "on-boarding" process).

On your first day of employment, you must provide documentation that you have authorization to work in the United States. The offer is contingent upon you providing appropriate I-9 documentation (see enclosed).

Two copies of this offer letter have been provided. Please sign the offer letter and return it to me as soon as possible. The second copy should be retained for your personal records.

Jason, we look forward to you joining Tenneco and are excited for you to contribute and share in its future success. Please contact me to acknowledge your acceptance or with any other questions or concerns.

Sincerely,

By: /s/	Gregg A. Bolt
Name:	Gregg A. Bolt
Title:	Sr VP Global Human Resources and Administration

Tenneco Automotive Operating Company Inc., a Tenneco company

I have read, understood and accept this offer of employment at a subsidiary of Tenneco Inc.

By: /s/	Jason M. Hollar
Print Name:	Jason M. Hollar

Exhibit 10.44

PERSONAL AND CONFIDENTIAL

December 6, 2012

Gregg A. Bolt

541 E. Erie Street, Unit 503
Milwaukee, WI 53202

Dear Gregg:

I am pleased to provide for your consideration this letter offering employment to be Tenneco's new Senior Vice President, Global Administration. I am confident that you will be a valuable addition to the Company's senior leadership team.

For purposes of this offer, your first day of work at the Company will be February 1, 2013. The key terms of Tenneco's offer of employment are described below.

Outline of Employment Offer

1. Position : Your position will be Senior Vice President, Global Administration of Tenneco Inc., reporting directly to the Chairman & Chief Executive Officer.

2. Base Salary : Your initial base salary will be $458,000 per year ($38,167 per month) less taxes and withholding . paid in accordance with Tenneco ' s normal payroll practices. Each year, your base salary will be reviewed and, in turn, may be adjusted and approved by the Compensation, Nominating and Governance Committee of Tenneco lnc.'s Board of Directors (the "CNG Committee").

3. Annual Incentive Compensation : You will be eligible to participate in Tenneco's executive annual incentive plan in a manner consistent with other Tenneco executives in the E7 grade . The terms of the annual incentive plan are set forth in the Tenneco Value Added Incentive Compensation Plan ("TAVA Plan"). Your initial target bonus opportunity for the 2013 calendar year performance period under the TAVA Plan will be 70% of your base salary (or $320,600 based on the offered salary, pro-rated to the date that your employment commences with the Company). The payment of an annual incentive to you is subject to achievement of pre-defined performance goals for the Company, the approval by the CNG Committee, as well as the terms of the TAVA Plan (or successor plan).

4 . Long-term Incentive Compensation : You will be eligible to participate in Tenneco's long-term incentive plan in a manner consistent with other Tenneco executives in the E7 grade. The terms of the long-term incentive plan are set forth in the Tenneco Long-Term Incentive Plan , as amended ("LTIP"). Under the LTIP, you will be eligible to receive annual awards of stock options, restricted stock, and long-term performance units (LTPUs), or potentially other

stock-based awards. Each year, the CNG Committee will determine and approve the mix of long-term incentive awards that will be granted to you and the aggregate target value of these awards. The aggregate target value of your long-term incentive award for calendar year 2013 is currently projected to be $715,000. The final award size, performance conditions and other terms of this award will be approved by the CNG Committee in January 2013, at the same time the terms of these awards are established for other executives at the Company. Subject to approval by the CNG Committee, you will also be entitled to receive pro-rated awards for the 2011-2013 and 2012-2014 performance periods. Grants made to you under the LTIP are subject to the terms and conditions of the LTIP (or any successor plan) and any applicable award agreements .

5. Health, Welfare and Retirement Benefits : You will be eligible to participate in Tenneco's broad-based health, welfare and defined contribution retirement plans in a manner consistent with other Tenneco executives in the E7 grade. Please refer to benefit plan documents for specific terms and eligibility. The Company reserves the right to change these benefit programs and any of our other benefit programs .

6. Vacation and holiday paid time off . You will be entitled to three weeks of paid vacation per year in accordance with the provisions of the Company ' s vacation policy, including usage, carryover and payment for unused vacation. In addition, the Company is typically closed during the week between the Christmas and New Year's Day holidays. You will also be eligible for paid holidays and personal floating holidays in accordance with the Company's policies.

7. Severance Protection . You will be eligible to participate i n the Company's following severance arrangements in a manner consistent with other Tenneco executives in the E7 grade: (i) the Tenneco Severance Benefit Plan ("Severance Plan") and (ii) the Tenneco Change of Control Severance Benefits Plan for Key Executives (“CIC Plan").

8. Employment at Will . This offer does not constitute a contract of employment for any specific period of time, but will create an employment at-will relationship that may be terminated at any time by you or the Company, with or without cause.

9. Standard Employee Confidentiality Agreement . Attached is the form of the Company's standard Confidentiality Agreement which you would be required to sign when your employment with the Company commences. We will also provide you documents for you to sign to allow us to do a standard background check.

Replacement of Forfeited Equity Grants and Benefits

As a result of your forfeiture of certain unvested equity grants and other compensation at your current employer that will occur with your termination of employment, Tenneco will grant you a make-up equity award ("Make-Up Grant," as described below). The Make-Up Grant will consist of Tenneco restricted shares. Subject to the discretion of the CNG Committee, the award will be made in one or more grants over the first one or two years of your employment. The timing and size of the award(s) would be based on the Company's ability to grant shares relative to internal equity constraints, if any, for compensation levels and equity awards to other senior executives within the same year. Subject to approval by the CNG Committee, (i) the first grant will be awarded as soon as practicable upon the start of your employment in 2013 and (ii) the second grant, if needed, would be made one year later in 2014 and would be dependent on your continued employment with Tenneco as of the date of the grant and acceptable performance during the first year of your performance.

For purposes of determining the size of the Make-Up Grant, the value will be based on: 1) the value of your unvested Quad Graphics restricted stock awards that will be forfeited upon termination, plus 2) the "spread" value of in-the-money stock options that will be forfeited upon termination along with an additional +20% premium added to the total calculated value of the in the-money stock options, using a 45-trading day average slack price of Quad Graphics common stock as of your employment date. The total value of the Make-Up Grant also will include the replacement of approximately $10,000 in unvested retirement benefits that you will forfeit upon termination from your current employer.

The number of shares of Tenneco restricted stock that will be granted to you will be based on the 45-trading day average share price of Tenneco common stock determined as of each applicable grant date. The Make-up Grant will be substantially in the form currently used by the Company and filed with the Securities and Exchange Commission for restricted stock grants, including with respect to vesting and the payment of dividends on any restricted shares.

***

Gregg, we look forward to you joining Tenneco and are excited for you to contribute and share in its future success. Please contact me to acknowledge your acceptance or with any other questions or concerns.

Sincerely,

Tenneco Inc

By: /s/	<u>Gregg M. Sherrill</u>
Name:	Gregg M. Sherrill
Title:	Chairman and Chief Executive Officer

I have read, understood and accept this offer of employment at Tenneco Inc.

By: /s/	<u>Gregg A. Bolt</u>
Print Name:	Gregg A. Bolt

Exhibit 10.45

TENNECO INC.

PERSONAL AND CONFIDENTIAL

June 12, 2013

Gregg A. Bolt
541 E. Erie Street, Unit 503
Milwaukee, WI 53202

Dear Gregg :

This letter agreement amends as set forth herein the Offer Letter dated December 6, 2012 by and between Tenneco Inc. and you (the "Offer Letter").

1. Effective February 1, 2013, the section entitled "Replacement of Forfeited Equity Grants and Benefits" is hereby deleted from the Offer Letter in its entirety and replaced with the following:

Replacement of Forfeited Equity Grants and Benefits
As a result of your forfeiture of certain unvested equity grants and other compensation at your current employer that will occur with your termination of employment, Tenneco will grant you a make-up equity award ("Make-Up Grant," as described below). The Make-Up Grant will consist of Tenneco restricted shares. Subject to the discretion of the CNG Committee, the award will be made in one or more grants over the first one or two years of your employment. The timing and size of the award(s) would be based on the Company's ability to grant shares relative to internal equity constraints, if any, for compensation levels and equity awards to other senior executives within the same year. The first grant of Tenneco restricted stock (6,708 shares valued at $250,000) was made on February 1, 2013. Subject to approval by the CNG Committee, the future grants will be made later in 2013 or in 2014.

For purposes of determining the size of the Make-Up Grant, the value will be based on: 1) the value of your unvested Quad Graphics restricted stock awards that will be forfeited upon termination, plus 2) the "spread" value of in-the-money stock options that will be forfeited upon termination along with an additional +20% premium added to the total calculated value of the in the-money stock options, using a 45-trading day average stock price of Quad Graphics common stock as of your employment date. The total value of the Make-Up Grant also will include the replacement of approximately $10,000 in unvested retirement benefits that you will forfeit upon termination from your current employer. The total value of the Make-Up Grant is $598,947.

2. The number of shares of Tenneco restricted stock that will be granted to you will be based on the closing share price of Tenneco common stock on each applicable grant date. The Make-up Grant will be substantially in the form currently used by the Company and filed with the Securities and Exchange Commission for restricted stock grants,

including with respect to vesting and the payment of dividends on any restricted shares. If your employment with the Company terminates due to your death or Total Disability, you or your spouse, as the case may be, shall be entitled to receive a cash payment in an amount equal to the difference between (i) $598,947 and (ii) the value of the Tenneco restricted stock (valued as of each applicable grant date) previously received by you in connection with the Make-Up Grant. The section entitled "Replacement of Foregone Pay" in the Summary of Employment Terms attached to the Offer Letter is hereby deleted in its entirety.

3. Except as amended hereby, the Offer Letter shall continue in full force and effect.

Sincerely,

Tenneco Inc.

By: /s/	Gregg M. Sherrill
Name:	Gregg M. Sherrill
Title:	Chairman and Chief Executive Officer

Accepted and Agreed

By: /s/	Gregg A. Bolt
Print Name:	Gregg A. Bolt

Exhibit 10.46

STRICTLY PRIVATE

Mr. Patrick GUO

March 26th 2007

Dear Patrick,

This letter of understanding will confirm our mutual agreement relative to the terms and conditions applicable to your international assignment.

The terms and conditions of your assignment are set forth in this Letter and are administered in accordance with the Tenneco International Assignment Guidelines for the specific terms and conditions authorized for this assignment.

Your employment during this International Assignment is contingent upon you securing and maintaining the right to work and reside in China, along with obtaining any necessary medical clearances, if applicable.

This policy may be changed from time to time as legal requirements may dictate, new practices may require, or for other reasons at the discretion of the Company, but/and any specific changes impacting your assignment will be made by mutual consent between you and the Company. If questions should arise concerning any provision of this Letter or any subsequent revisions of policies applicable to employees on international assignment, you are urged to consult with Therese Meyer of the Assignment Management Services Team in Chicago, Illinois at (312) 665-2579.

General

Place of Employment: China
Position Title: Managing Director China Base Salary: $ 210,000.00 US
TAVA Target:$ 59,000.00 US
Reporting to: Hari Nair
Assignment Effective Date: anticipated between June 1 - July 1, 2007 Anticipated Duration of Assignment: 3 to 5 Years
Point of Origin: USA

Compensation and Foreign Assignment-Related Benefits

At the commencement of your international assignment, your compensation will be as estimated in the attached International Compensation Sheet. This compensation reflects your position level within the Tenneco structure and is exclusive of mandatory or voluntary deductions . Salary administration will continue to be handled in accordance with Tenneco practices, and adjustments made according to salary guidelines established within Tenneco.

Your compensation will be administered through the Tenneco US payroll, with appropriate deposits to your bank accounts.

Some of the specific provisions that will apply to your International assignment are described below:

1. You will be eligible for participation in the various Tenneco benefit plans and will be determined in accordance with the provisions of such plans. To the extent such plans will permit, your base salary (exclusive of allowances) shall be the basis for the calculation of coverage and retirement benefits . Assignment-related allowances will not be included in the calculation of coverage and retirement benefits.

2. Signing bonus: during the first month of employment, you will receive a gross signing bonus equal to 50,000 $, subject to required withholdings.

3. Retention bonus : 6 months after your first employment date and 12 months after your employment date, you will receive a gross bonus amount of
50,000 $ each, subject to the required withholdings. These payments will be made upon the condition that you are actively employed at the time of this payment and that you have not given employment notice.

4. Home leave is time off with pay plus round trip airfare. You are entitled to 1 (one) annual home leave for you and your family in business class or 2 (two) annual home leaves if economy airfares are being utilized.

5. Vacation eligibility is based on the greater of your home country vacation policy or local applicable rules, resulting in 20 annual vacation days . Time off during home l eave will be charged as vacation time.

6. The Company will pay your rent directly for the duration of your assignment up to a maximum of 7,500 $/month .

7. The Company will provide a monthly utility allowance. Reimbursable costs include gas, oil heat, electricity, water, garbage pick-up, one phone line, fax and internet connection at home.

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8. You will be eligible for a company-provided vehicle and driver, subject to local practices and guidelines.

9. The Company will provide reimbursement of the tuition fees for the employee's child(ren) - children up to the age of 18 - at an International or foreign language school in China.

10. You will receive a Goods and Services Differential intended to help defray excess costs between goods and services, excluding shelter costs, in China and comparable goods and services in your home country. This differential is based on information provided by consultants who specialize in measuring expatriate living costs around the world.

    The specific amount of your differential is dependent upon base salary and size of your family actually living with you in the host country. It will fluctuate in relation to changes not only in salary and family size, but also relative to consumer price changes in China and fluctuations in the exchange rate. It may increase, decrease or be reduced to zero in relation to the above-noted factors. Currently the Goods and Services Differential is estimated to be approx. $18,000 per year.

11. The calculation and administration of specific benefits allowed under the terms of this assignment will be in accordance with the TA International Assignment Guidelines.

12. A one-time gross relocation allowance, subject to required tax and social security withholdings, will be paid equal to an amount of 2,500 $

Tax Equalization

We would also like to call your attention to Tenneco's Tax Equalization Guidelines. During expatriation, in order to equalize your tax bill with that of your domestic counterpart at the same level of income, a hypothetical federal and state (if applicable) income tax will be deducted from your total salary and, in turn, the Company will fund payment of your taxes in China. Even if there is no foreign tax obligation, Tenneco wilt still retain these hypothetical tax deductions. Should you resign or be discharged for cause, you will be covered under the tax equalization policy until your separation date.

KPMG LLP will conduct an interview to ensure your familiarity with US and China tax requirements. For each year in which you are on the assignment, and for the following year if required, they will also prepare your US federal and state tax returns and China tax returns (as required). Additionally, they will provide the Company with a statement of the tax liability on your total income subject to certain limitations. The Company will pay tax preparation fees.

Other Matters
Tenneco will not guarantee the term of any foreign assignment. Normally, a long-term foreign assignment is expected to be for a period varying from one to three years. The actual time will vary and may be impacted by personal emergencies, Company business circumstances or performance. Should your assignment continue beyond a four-year period, the Company reserves the right to renegotiate the terms of this assignment letter.

The Company will provide for relocation to your Point of Origin or to some other mutually agreed upon area upon termination of the foreign assignment. While the Company cannot provide a guarantee of any specific assignment, grade or salary upon return, the Company's best efforts will be made to assign you to a position in keeping with both experience and performance. If you are returning to your Point of Origin, and, elected to sell your residence upon your expatriation or during your foreign assignment, the Company will not provide Mortgage Assistance or New Home Purchase Closing Costs. However, should the Company relocate you to an area different than your Point of Origin in support of the company's needs, you would be eligible to receive both the Mortgage Assistance and New Home Purchase Closing Costs.
It is agreed that in case of termination for other reasons than 'gross misconduct'
a six (6) months base salary gross indemnity will be paid.

The laws of state of Illinois and policies of Tenneco-US will govern the terms and conditions of your employment and termination of employment (voluntary or Involuntary).

This Letter of Understanding does not create a contract of employment between you and the Company for any specified period. Your employment with Tenneco is an employment at will which means that either you or the Company may terminate your employment at any time, with or without cause, upon notice to the other. We request that you acknowledge receipt of this Letter and agreement with its terms by signing and returning a copy.

Sincerely yours,

By: /s/ Hari Nair
Name: Hari Nair

Acknowledge and Concur:

By: /s/ Patrick Guo

Exhibit 10.47

CONFIDENTIAL

Patrick Guo

Shanghai, China

February 29, 2012

Dear *Patrick:*

This letter of understanding will confirm our mutual agreement relative to the terms and conditions applicable to your international assignment extension to your current Letter of Understanding dated **March 26, 2007.**

The terms and conditions of your current assignment letter dated **March 26, 2007** remain in effect. This letter provides an extension date for your assignment in Shanghai, China through between 3-5 years, July 1, 2015-July 1, 2017.

If questions should arise concerning any provision of this Letter or any subsequent revisions of policies applicable to employees on international assignment, you are urged to consult with Terri Meyer of the Global Management Assignment Services, Chicago, Illinois at (312) 665-2579.

Sincerely yours,

By: /s/	Barbara Kluth
Name:	Barbara Kluth
Title:	Sr. Vice President, Global Human Resources

DISTRIBUTION:

Rex Abercrombie (Tenneco)
Danny Pollaris (Tenneco)
Terese Meyer (KPMG)

Acknowledge and Concur

By: /s/ Patrick Guo

Return one copy to :	Barbara Kluth	and	Therese Meyer
	Tenneco Inc		KPMG
	500 North Field Drive		303 E. Wacker Drive
	Lake Forest, IL 60045		Chicago, IL 60601

Exhibit 10.48

TENNECO INC.
INCENTIVE DEFERRAL PLAN
(As Amended and Restated Effective as of January 1, 2018)

TENNECO INC. INCENTIVE DEFERRAL PLAN
(As Amended and Restated Effective as of January 1, 2018)

1. Purpose

Tenneco Inc., formerly known as Tenneco Automotive Inc. ("Tenneco") previously adopted the Tenneco Automotive Inc. Incentive Deferral Plan, effective January 1, 2005 (the "Plan"). The Plan was amended and restated effective as of January 1, 2008 and, at that time, was renamed the "Tenneco Inc. Incentive Deferral Plan". The Plan was further amended and restated effective as of August 1, 2013. The following provisions constitute an amendment, restatement and continuation of the Plan effective as of January 1, 2018. The purpose of the Plan is to provide directors and a select group of management or highly compensated employees of Tenneco and its subsidiaries and affiliates (hereinafter collectively referred to as the "Company") an opportunity to defer compensation received by them from the Company in accordance with the terms and conditions set forth herein. The Plan is intended to comply with Section 409A of the Internal Revenue Code of 1986, as amended (the "Code") and will be interpreted and administered in accordance therewith.

2. Adoption and Administration

The Plan shall be administered by the Compensation/Nominating/Governance Committee of the Board of Directors of Tenneco (the "Committee"). The Committee shall have the sole and complete authority and discretion to interpret the terms and provisions of the Plan and to adopt, alter and repeal such administrative rules, regulations and practices governing the operation of the Plan, and to determine facts under the Plan as it shall from time to time deem advisable. The Committee may delegate to any committee or any other person such powers and duties in connection with the administration of the Plan as the Committee may from time to time prescribe to the extent not prohibited by applicable law.

3. Eligibility

Directors and executive incentive level U.S. participants in the Company's annual performance bonus plan (currently known as the Tenneco Inc. Annual Incentive Plan) shall be eligible to participate in the Plan.

An employee who is eligible to participate in the Plan shall become a "Participant" upon the date that his or her Deferral Election (as defined below) first becomes effective. All directors who are not employees of the Company ("Outside Directors") are eligible to participate in the Plan and an Outside Director shall become an "Outside Director Participant" upon the date that his or her Deferral Election first becomes effective.

For purposes of the Plan, a "Deferral Election" is a written election, filed by an eligible employee or Outside Director in accordance with rules and procedures established by the Committee, to defer compensation pursuant to Section 4 or Section 5, as applicable.

4. Elections to Defer--Employees

An eligible employee will become a Participant by filing a Deferral Election to defer receipt of all or a specified portion of his or her annual bonus or incentive compensation ("Annual Incentive Compensation") to be received with respect to a calendar year, provided that the Annual Incentive Compensation is contingent on the satisfaction of pre-established organizational or individual performance criteria relating to a performance period of at least 12 consecutive months. Annual Incentive Compensation that may be deferred under the Plan must qualify as performance-based compensation under Code Section 409A.

Except as provided herein, a Deferral Election must be made prior to June 30 of the calendar year for which the Annual Incentive Compensation will be awarded (or such earlier date specified by the Committee) and shall be irrevocable at such time as specified by the Committee, but in no event later than the applicable June 30. A employee who first becomes eligible to participate in the Plan shall have 30 days following the date on which he or she first becomes eligible to participate in the Plan to make a Deferral Election with respect to Annual Incentive Compensation to be awarded for that calendar year. Where the Deferral Election is made in the first year of eligibility but after the beginning of the performance period for the Annual Incentive Compensation, the Deferral Election (which shall be irrevocable when made) shall apply to no more than an amount equal to the total amount of the Annual Incentive Compensation for the performance period, multiplied by the ratio of the number of days remaining in the performance period after the Deferral Election is made over the total number of days in the performance period. Annual Incentive Compensation deferred under the Plan shall be referred to as the "Deferred Amounts".

Each Deferral Election shall indicate whether the Annual Incentive Compensation credited to the Participant's Deferred Compensation Account (described in Section 6 below) for a given calendar year shall be distributed to the Participant as a specified date in-service distribution or as a distribution upon termination of employment with the Company as described in Section 8(a), provided that the same distribution date shall be selected for all Deferred Amounts deferred for a given calendar year. If the Participant does not indicate in the Participant's Deferral Election that his or her Deferred Amounts deferred for a given calendar year are to be distributed as a specified date in-service distribution, or if the Participant terminates employment with the Company prior to the date of his or her specified date in-service distribution, such Deferred Amounts shall be distributed to the Participant upon his or her termination of employment with the Company as described in Section 8(a).

5. Elections to Defer--Outside Directors

An Outside Director will become an Outside Director Participant by filing a Deferral Election to defer receipt of all or a specified portion of his or her annual cash retainer fee or any other applicable cash fees (collectively, "Cash Fees") with respect to a calendar year, subject to the terms of the Plan. Except as provided herein, a Deferral Election must be made prior to December 31 of the calendar year preceding the calendar year to which the Deferral Election will apply (or such earlier date specified by the Committee) and shall be irrevocable at such time as specified by the Committee, but in no event later than the applicable December 31. An Outside Director's Deferral Election will remain in effect for subsequent calendar years unless and until modified by the Outside Director for a subsequent calendar year in accordance with the terms of the Plan and in accordance with rules and procedures established by the Committee.

A newly appointed or elected Outside Director shall have 30 days following his or her initial appointment or election as a director to make a Deferral Election with respect to his or her Cash Fees for services to be performed after the election and during the remainder of the calendar year of his or her initial appointment or election and any Deferral Election filed in accordance with this sentence shall be irrevocable when filed with the Committee.

All amounts credited to an Outside Director's Deferred Compensation Account (described in Section 6 below) shall be distributed to the Outside Director upon his or her separation from service with the Company as described in Section 8(b).

6. Establishment of Deferred Compensation Account

The Committee shall establish, or cause to be established, a memorandum account (a "Deferred Compensation Account") on its books of the Company for each Participant and Outside Director Participant at the time the Participant's or Outside Director's Deferral Election first becomes effective. Deferrals under Section 4 and Section 5 shall be credited to the Deferred Compensation Account of the respective Participant or Outside Director Participant for a given calendar year as of the day on which he or she would otherwise be entitled to receive the compensation. Any required withholding for taxes (e.g., Social Security taxes) on the Deferred Amount shall be made from other compensation of the Participant. Adjustments as provided in Section 7 shall be made to the Deferred Compensation Accounts.

7. Adjustments to Deferred Compensation Accounts

The Company shall credit, or shall cause to be credited, the balance of each Deferred Compensation Account with an earnings factor equal to the amount such Deferred Compensation Account would have earned if it had been invested in the investment options listed below. A Participant or Outside Director Participant may select the investment option used to determine the earnings factor with respect to his or her Deferred Compensation Account and may change the selection at any time. More than one investment option may be selected in increments of at least one (1) percent. The Company reserves the right, in its sole discretion, to change, amend, add or remove investment options at any time and in any manner it deems appropriate without the consent of the Participants or Outside Director Participants. If a Participant or Outside Director Participant has not selected an investment option with respect to his or her Deferred Compensation Account, the Deferred Compensation Account shall be adjusted based on the earnings factor described in clause (a) below. The investment options used to determine the earnings factor are:

(a) The prime rate of interest as reported by JPMorgan Chase Bank at the first day of each calendar month.

(b) Tenneco stock index account — the amount of deferral will be invested in Tenneco stock equivalent unit account. Any investment in this account will be measured solely by the performance of Tenneco's common stock (including dividends that will be reinvested). Amounts credited to this account will be settled either in cash or, if the Committee so elects, shares of Tenneco's common stock and will be offered under Tenneco's principal equity incentive plan then in effect. If settlement is to be in the form of shares of Tenneco common stock, such settlement shall be subject to all requirements of applicable law, the terms of Tenneco's principal equity incentive plan from which the shares will be issued and the rules of any stock exchange on which the shares are listed.

(c) The return under certain investment funds chosen by the Company from time to time in its sole discretion, which shall be communicated to the Participants and Outside Director Participants.

The Company is under no obligation to acquire or provide any of the investments designated by a Participant or Outside Director Participant, and any investments actually made by the Company will be made solely in its name and will remain its property. The crediting of an earnings factor shall occur so long as there is a balance in the Participant's or Outside Director Participant's Deferred Compensation Account regardless of whether the Participant or Outside Director Participant has separated from service.

8. Time and Form of Payment

(a) Subject to Section 8(c) below, a Participant's Deferred Amount, if any, for any given calendar year, as adjusted pursuant to Section 7, shall be distributed in a single lump sum to the Participant, or the Participant's beneficiary, within 60 days after the earlier to occur of:

(i) the termination of the Participant's employment, or

(ii) the date specified for a specified date in-service distribution in the applicable Deferral Election made by the Participant, if any.

(b) An Outside Director Participant's Deferred Compensation Account, as adjusted pursuant to Section 7, shall be distributed in a single lump sum within 60 days after the Outside Director Participant's separation from service with the Company.

(c) For purposes of the Plan, the terms "terminated employment," "termination of employment," "separation from service," and variations thereof, are intended to mean a "separation from service" under Code Section 409A.

(d) Notwithstanding Section 8(a), with respect to any Participant who is a "specified employee" under Code Section 409A, distribution of such Participant's Deferred Compensation Account upon a termination of employment shall be delayed until the earlier to occur of the Participant's death or the date that is six months and one day following the Participant's termination of employment.

(e) A Participant may elect by filing a written election in accordance with procedures established by the Committee (a "Distribution Change Election") to delay the specified date in-service distribution of all or a portion of any Deferred Amount credited to such Participant's Deferred Compensation Account for a given calendar year to a subsequent time, provided that the Distribution Change Election is filed at least 12 months before the date the specified date in-service distribution is otherwise scheduled to be made. A Distribution Change Election that is filed in accordance with the preceding sentence shall not be effective until at least 12 months after it is filed with the Committee and shall defer distribution of such Deferred Amount for at least five years from the date distribution would otherwise have been made (but no later than the Participant's termination of employment, except as otherwise provided in Section 7(c) above). A Participant's Distribution Change Election shall be irrevocable when filed with the Committee. A Participant may not make more than one Distribution Change Election with respect to any Deferred Amount credited to such Participant's Deferred Compensation Account for a given calendar year.

9. Reports

The Committee shall provide a statement to Participants and Outside Director Participants quarterly concerning the status of his or her Deferred Compensation Account.

10. Transferability of Interests

The rights and interests of each Participant and Outside Director Participant during the period of deferral shall be those of a general unsecured creditor except that such Participant's or Outside Director Participant's rights and interests may not be reached by the creditors of the Participant or Outside Director Participant or their beneficiaries, respectively, or anticipated, assigned, pledged, transferred or otherwise encumbered except in the event of the death of the Participant or Outside Director Participant, and then only by will or the laws of descent and distribution.

11. Amendment, Suspension and Termination

Tenneco, at any time, through action of the Committee, may amend, suspend or terminate the Plan or any portion thereof in such manner and to such extent as it may deem advisable and in its best interests. No amendment, suspension or termination shall reduce the amount then credited to the Participant's Deferred Compensation Account (other than as a result of future adjustments pursuant to Section 7).

12. Unfunded Obligation

The Plan shall not be funded; no trust, escrow or other provisions shall be established to secure payments and distributions due under the Plan; and the Plan shall be regarded as unfunded for purposes of the Employee Retirement Income Security Act of 1974, as amended, and the Code. Each Participant and Outside Director Participant shall be treated as a general, unsecured creditor at all times under the Plan, and shall have no rights to any specific assets of the Company. All amounts credited to the memorandum accounts of the Participants and Outside Director Participants will remain general assets of the Company and shall be payable solely from the general assets of the Company.

13. No Right to Employment or Other Benefits

Nothing contained herein shall be construed as conferring upon any Participant the right to continue in the employ of the Company. Any compensation deferred and any payments or distributions made under this Plan shall not be included in creditable compensation in computing benefits under any employee benefit plan of the Company except to the extent expressly provided therein.

14. Dispute Resolution

By participating in the Plan, each Participant and Outside Director Participant agrees that any dispute arising under the Plan shall be resolved by binding arbitration in Lake Forest, Illinois under the rules of the American Arbitration Association and that there will be no remedy besides the disputed deferred compensation amount in issue.

15. Code Section 409A

(a) Except as otherwise permitted under Code Section 409A and the guidance and Treasury regulations issued thereunder, the time or schedule of any payment or distribution or amount scheduled to be paid or distributed pursuant to the Plan may not be accelerated.

(b) The Plan and the benefits provided hereunder are intended to comply with Code Section 409A to the extent applicable thereto. Notwithstanding any other provision of the Plan to the contrary, the Plan shall be interpreted and construed consistent with this intent. Notwithstanding the foregoing, the Company shall not be required to assume any increased economic burden in connection therewith. Although the Company and the Committee intend to administer the Plan so that it will comply with the requirements of Code Section 409A, neither the Company nor the Committee represents or warrants that the Plan will comply with Code Section 409A or any other provision of federal, state, local, or non-United States law. None of Tenneco, its subsidiaries, its affiliates nor any of their respective directors, officers, employees or advisers shall be liable to any Participant or Outside Director Participant (or any other individual claiming a benefit through a Participant or Outside Director Participant) for any tax, interest or penalties the Participant or Outside Director Participant may owe as a result of participation in the Plan, and the Company shall have no obligation to indemnify or otherwise protect any Participant or Outside Director Participant from the obligation to pay any taxes pursuant to Code Section 409A.

IN WITNESS WHEREOF, Tenneco has caused the Plan to be executed on its behalf by its respective officers thereunder duly authorized, as of January 1, 2018.

TENNECO INC.

By: /s/	Gregg A. Bolt
Name:	Gregg A. Bolt
Title:	Senior Vice President Global Human Resources and Administration

Exhibit 10.49

TENNECO INC.
EXCESS BENEFIT PLAN

(As Amended and Restated Effective as of January 1, 2018)

SECTION 1

GENERAL

1.1. History, Purpose and Effective Date . Tenneco Inc. (“Tenneco”) previously adopted the Tenneco Inc. Excess Benefit Plan (the “Plan”), effective as of January 1, 2007 to provide benefits to eligible employees of Tenneco and the Employers (as defined in subsection 1.2) whose benefits under the Tenneco 401(k) Retirement Savings Plan (the “401(k) Plan”) are limited as the result of certain limitations of the Internal Revenue Code of 1986, as amended (the “Code”), and as a result of the compensation that is taken into account under the 401(k) Plan for contribution purposes. The Plan was amended and restated effective as of January 1, 2013 and has been further amended. The following provisions constitute an amendment, restatement and continuation of the Plan effective as of January 1, 2018 (the “Effective Date”). The Plan is intended to constitute an unfunded plan maintained primarily for the purpose of providing deferred compensation for a select group of management or highly compensated employees. The Plan is intended to comply with section 409A of the Internal Revenue Code of 1986, as amended (the “Code”) and will be interpreted and administered in accordance therewith.

1.2. Employers and Related Companies . Tenneco and any Related Company which, with the consent of Tenneco, adopts the Plan are referred to below collectively as the “Employers” and individually as an “Employer”. The term “Related Company” means any corporation or trade or business during any period that it is, along with Tenneco, a member of a controlled group of trades or businesses within the meaning of sections 414(b) and (c) of the Code. As of the Effective Date, Tenneco Automotive Operating Company will continue as an Employer under the Plan without any further action of any person.

1.3. Plan Administration . The authority to control and manage the operation and administration of the Plan will be vested in the Tenneco Benefits Committee (the “Administrative Committee”). In controlling and managing the operation and administration of the Plan, the Administrative Committee will have full and discretionary power and authority to conclusively interpret and construe the provisions of the Plan, to determine the amount of benefits and the rights or eligibility of employees or Participants under the Plan and to establish a claims procedure, and will have such other powers and authorities as may be necessary to discharge its duties hereunder. Any interpretation of the Plan and any decision made by the Administrative Committee on any matter within the discretion of the Administrative Committee shall be binding on all persons. A misstatement or other mistake of fact shall be corrected when it becomes known, and the Administrative Committee shall make such adjustment on account thereof as it considers equitable and practicable. The Administrative Committee may delegate such of its ministerial or discretionary duties and functions as it may deem appropriate to any employee or group of employees of any Employer.

1.4. Source of Benefit Payments . Benefits payable under the Plan by any Employer will be paid from the general revenues and assets of such Employer and no Employer will be required to set up a funded reserve or otherwise set aside specific funds for the payment of its obligations under the Plan. None of the individuals entitled to benefits under the Plan will have any claim on, or any beneficial ownership interest in, any assets of any Employer, and any rights of such individuals under the Plan will constitute unsecured contractual rights only.

1.5. Applicable Laws . The Plan will be construed and administered in accordance with the internal laws of the State of Illinois to the extent that such laws are not preempted by the laws of the United States of America.

1.6. Gender and Number . Where the context admits, words in any gender will include any other gender, words in the singular will include the plural and the plural will include the singular.

1.7. Plan Year . The Plan Year shall be the calendar year.

1.8. Supplements . The provisions of the Plan as applied to any Employer, to any group of employees of any Employer may, with the consent of Tenneco, be modified or supplemented from time to time by the adoption of one or more Supplements. Each Supplement shall form a part of the Plan as of the Supplement's effective date. In the event of any inconsistency between a Supplement and the Plan document, the terms of the Supplement shall govern.

SECTION 2

PARTICIPATION

2.1. Eligibility for Participation . The Compensation/Nominating/Governance Committee of Tenneco (the "CNG Committee") has determined that those employees of the Employers with a designation of EICP 1 or higher (other than any such employee who is specifically excluded from participation by the CNG Committee) shall be eligible to participate in the Plan (each an "Eligible Employee"). Once an individual has been designated as an Eligible Employee, he shall remain as an Eligible Employee as long as he continues to be employed by the Employers or, if earlier, the first day of the first Plan Year following the date as of which he is no longer designated EICP 1 or higher.

2.2. Effective Date of Participation; Reemployment . Each person who is an Eligible Employee as of the first day of a Plan Year shall become a "Participant" in the Plan as of the first day of the Plan Year. If a person becomes an Eligible Employee after the first day of a Plan Year, he shall become a "Participant" in the Plan as of the first day on which he is an Eligible Employee. Once an individual becomes a Participant in the Plan for a Plan Year, he shall remain a Participant for the entire Plan Year (or portion thereof); provided, however, that an individual's participation in the Plan for a Plan Year shall end as of his Termination Date (as defined in subsection 5.1(a)) except as provided in Section 3. Notwithstanding the foregoing, if a Participant's Termination Date occurs during a Plan Year and he is employed or reemployed by an Employer or Related Company prior to the last day of the Plan Year, he shall immediately become a Participant upon his reemployment.

2.3. Restricted Participation . During any period that a Participant continues in the employ of an Employer or a Related Company but is not an Eligible Employee and during any period for which no Employer Deferred Contributions (as defined in subsection 3.2) are made with respect to the Participant, the Participant, or in the event of his death, his beneficiary, will be considered and treated as a Participant for all purposes of the Plan except for purposes of Section 3.

2.4. Plan Not Contract of Employment . The Plan does not constitute a contract of employment or continued service, and nothing in the Plan will give any Participant the right to be retained in the employ of any Employer, nor any right or claim to any benefit under the Plan, except to the extent specifically provided under the terms of the Plan.

SECTION 3

ACCOUNTS AND CONTRIBUTIONS

3.1. Participant Accounts . The Administrative Committee shall maintain a bookkeeping "Account" in the name of each Participant to reflect such Participant's interest under the Plan.

3.2. Contributions .

(a) Participant Contributions . Participants are not required or permitted to make any contributions under the Plan.

(b) Employer Bonus Contributions . Each Employer shall make contributions to the Plan for each Plan Year ("Employer Bonus Contributions") on behalf of each of its employees who is a Participant for such Plan Year who was paid a bonus (or who would have been paid a bonus but for a deferral election related to such bonus) under the Company's annual performance bonus plan (currently known as the Tenneco Inc. Annual Incentive Plan) (the "Bonus") from the Employer for such Plan Year. The amount of the Employer Bonus Contribution made by an Employer for any Plan Year on behalf of any Participant shall be equal to (i) the Company Retirement Contribution percentage that applies to such Participant for such Plan Year under the 401(k) Plan (determined as of the first day of the Plan Year (or the date on which the Participant was first eligible to participate in the 401(k) Plan for such Plan Year, if later), without regard to any changes in such percentage during the Plan Year), multiplied by (ii) the Bonus. Employer Bonus Contributions shall be credited to the applicable Participants' Accounts in accordance with subsection 4.1.

(c) Employer Retirement Contributions . Each Employer shall make contributions to the Plan for each Plan Year ("Employer Retirement Contributions") on behalf of each of its employees who is a Participant in the Plan for such Plan Year and whose Company Retirement Contributions under the 401(k) Plan for such Plan

Year are limited for such Plan Year by the limitations of section 401(a)(17) of the Code. The amount of Employer Retirement Contributions made by any Employer for any Plan Year on behalf of any Participant shall be equal to (i) the Company Retirement Contribution percentage that applies to such Participant for such Plan Year under the 401(k) Plan (determined as of the first day of the Plan Year (or the date on which the Participant was first eligible to participate in the 401(k) Plan for such Plan Year, if later) without regard to any changes in such percentage during the Plan Year), multiplied by (ii) the Participant's Compensation (as defined in the 401(k) Plan, but without regard to the limitations of section 401(a)(17) of the Code) for such Plan Year in excess of the limitations of section 401(a)(17) of the Code for such Plan Year. Employer Retirement Contributions shall be credited to the applicable Participants' Accounts in accordance with subsection 4.1.

(d) Employer Matching Contributions . Each Employer shall make contributions to the Plan for each Plan Year ("Employer Matching Contributions") on behalf of each of its employees who is a Participant in the Plan for such Plan Year, who has made the maximum permitted salary deferrals to the 401(k) Plan for such Plan Year, who is employed by the Employer on the last day of the Plan Year and whose Matching Company Contributions under the 401(k) Plan for such Plan Year are limited for such Plan Year by the limitations of section 401(a)(17) of the Code. The amount of Employer Matching Contribution made by any Employer for any Plan Year on behalf of any Participant shall be equal to the difference (but not less than zero) between (i) the maximum Matching Company Contributions that could have been made on behalf of the Participant under the 401(k) Plan for that year had the limitations of section 401(a)(17) of the Code had not applied minus (ii) the maximum Matching Company Contributions that could have been made on behalf of the Participant under the 401(k) Plan for that year taking into account the limitations of section 401(a)(17) of the Code. Employer Matching Contributions shall be credited to the applicable Participants' Accounts in accordance with subsection 4.1.

Employer Bonus Contributions, Employer Retirement Contributions and Employer Matching Contributions are sometimes collectively referred to herein as "Employer Deferred Contributions".

SECTION 4

PLAN ACCOUNTING

4.1. Adjustment of Accounts . Each Participant's Account shall be adjusted in accordance with this Section 4, in a uniform, nondiscriminatory manner, as of each business day on which the New York Stock Exchange is open for business (each an "Accounting Date"). As of each Accounting Date, the balance of each Participant's Account shall be adjusted as follows:

(a) first , charge to the Account balance the amount of any distributions under the Plan with respect to that Account that have not previously been charged;

(b) next, credit to the Account balance the amount of Employer Deferred Contributions made on behalf of the Participant in accordance with Section 3 since the preceding Accounting Date; and

(c) finally, adjust the Account balance for the applicable investment return in accordance with subsection 4.2.

4.2. Investment Return. The following shall apply with respect to amounts credited to a Participant's Account:

(a) Amounts credited to a Participant's Account in accordance with subsection 4.1 shall be adjusted as of each Accounting Date to reflect the value of an investment equal to the Participant's Account balance in one or more assumed investments that the Administrative Committee offers from time to time and communicated to Participants (the "Investment Funds"), and which the Participant directs the Administrative Committee to use for purposes of adjusting his Account. Such amount shall be determined without regard to taxes that would be payable with respect to any such Investment Fund, but will be adjusted for any investment management or similar fee that is customarily paid with respect to the Investment Fund.

(b) To the extent permitted by the Administrative Committee, the Participant may elect to have different portions of his Account balance for any period adjusted on the basis of different Investment Funds and any election by a Participant with respect to an Investment Fund shall be subject to such rules and regulations established from time to time by the Administrative Committee.

(c) Notwithstanding the election by Participants of certain investments in specified Investment Funds and the adjustment of their Accounts based on such investment elections, the Plan does not require, and no trust or other instrument that may be maintained in connection with the Plan shall require, that any assets or amounts that are set aside in trust or otherwise for the purpose of paying Plan benefits shall actually be invested in the investment alternatives selected by Participants.

(d) Any change in the Participant's investment direction shall be made in accordance with rules established by the Administrative Committee, shall apply prospectively only and shall be implemented as soon as practicable after the direction is received by the Administrative Committee.

The Administrative Committee may eliminate any Investment Fund at any time; provided, however, that the Administrative Committee may not retroactively eliminate any Investment Fund.

4.3. No Actual Investment. Notwithstanding any other provision of the Plan that may be interpreted to the contrary, the Investment Funds are to be used for measurement purposes only and Participants' election of any such Investment Fund, the allocation of amounts to Participants' Accounts, the calculation of any additional amounts and the crediting or debiting of amounts to Participants' Accounts shall not be considered or construed in any manner as an actual investment of Participants' Accounts in any investment alternative. In the event that Tenneco or any other Employer, in its own discretion, decides to invest funds in any or all of the investment funds that correspond to the Investment Funds under the Plan, no Participant shall have any rights in or to such actual investments themselves. Without limiting the generality of the foregoing, a Participant's Account balance shall at all times be a bookkeeping entry only and shall not represent any investment made on his behalf by the Employers and the Participant shall at all times remain an unsecured creditor of the Employers.

4.4. Statement of Plan Account . The Administrative Committee will cause to be delivered to each Plan Participant a statement of the balances of his Account as required by law.

SECTION 5

PAYMENT OF PLAN BENEFITS

5.1. Certain Definitions . For purposes of the Plan:

(a) A Participant's "Termination Date" shall mean the date on which his employment with the Employers and Related Companies terminates for any reason. Whether a Participant has had a termination of employment shall be interpreted and administered in all respects in accordance with section 409A of the Code and applicable regulations issued thereunder.

(b) A Participant's Years of Service shall be equal to the number of Years of Service credited to him under the 401(k) Plan for purposes of vesting; provided, however, that if a Participant is not a participant in the 401(k) Plan, his Years of Service shall be determined in accordance with the foregoing, as if he were a participant in the 401(k) Plan.

5.2. Vesting . A Participant shall become vested in his Employer Deferred Contributions, and income, loses, appreciation and depreciation attributable thereto, when he completes three Years of Service. If a Participant's Termination Date occurs prior to the date on which he completes three Years of Service, he shall forfeit the balance in his Account and he shall have no further rights to any portion of such balance.

5.3. Time and Form of Payment . The vested balance of a Participant's Account shall be distributed in a lump sum cash payment within 30 days following his Termination Date. Notwithstanding the foregoing or any other provision of the Plan to the contrary, if the Participant is a specified employee (within the meaning of section 409A of the Code) on his Termination Date, the amount credited to his Account under the Plan shall be paid in a lump sum cash payment on the first business day of the seventh month following his Termination Date.

5.4. Withholding for Tax Liability . Any Employer may withhold or cause to be withheld from any Employer Deferred Contributions or any other amounts otherwise due to the Participant or any payment of benefits made pursuant to the Plan any taxes required to be withheld and such sum as the Employer may reasonably estimate to be necessary to cover any taxes for which the Employer may be liable and that may be assessed with regard to such deferrals or payments under the Plan.

5.5. Beneficiary Designation. A Participant may, from time to time, designate in writing any legal or natural person or persons (who may be designated contingently or successively) to whom payments are to be made if the Participant dies before receiving payment of his entire Account balance. A beneficiary designation form will be effective only after it is filed in writing with the Administrative Committee while the Participant is alive and will cancel all beneficiary designation forms filed earlier.

5.6. Payment to Persons Under Legal Disability. In the event that any amount will be payable under this Plan to a Participant under legal or other disability who, in the opinion of the Administrative Committee, is unable to administer such payments, the payments will be made to the legal conservator of the estate of such Participant or, if no such legal conservator will have been appointed, then to any individual (for the benefit of such Participant) whom the Administrative Committee may from time to time approve.

5.7. Benefits May Not Be Assigned or Alienated. Benefits payable to Participants or beneficiaries under this Plan may not be anticipated, assigned (either at law or in equity), alienated, pledged, encumbered or subject to attachment, garnishment, levy, execution or other legal or equitable process.

5.8. Special Section 409A Provisions. It is intended that the Plan comply with the provisions of section 409A of the Code and all provisions of the Plan shall be construed and interpreted in accordance with the requirements of section 409A of the Code and applicable guidance thereunder.

SECTION 6

AMENDMENT AND TERMINATION

Tenneco reserves the right to amend or terminate the Plan by action of the CNG Committee, or the committee or person to which it delegates such authority, and each Employer reserves the right to terminate the Plan, as applied to it; provided, however, that no such amendment or termination of the Plan will reduce the amount credited to any Participant as of the date of such amendment or termination.

IN WITNESS WHEREOF, Tenneco has caused the Plan to be executed on its behalf by its respective officers thereunder duly authorized, as of the Effective Date.

TENNECO INC.

By: /s/	Gregg A. Bolt
Name:	Gregg A. Bolt
Title:	Senior Vice President Global Human Resources and Administration

SUPPLEMENT A
TO
TENNECO INC.
EXCESS BENEFIT PLAN

Application	A-1. This Supplement A to Tenneco Inc. Excess Benefit Plan shall apply as of January 15, 2007 to the benefits of Participant Gregg Sherrill (“Sherrill”).
Definitions	A-2. Unless the context clearly implies or indicates the contrary, a word, term or phrase used or defined in the Plan is similarly used or defined for purposes of this Supplement A.
Employer Retirement Contributions	A-3. Sherrill shall not be entitled to benefits pursuant to subsection 3.2 of the Plan and, in lieu thereof, he shall be entitled to Employer Deferred Contributions under the Plan in accordance with this Section A-3. For each Plan Year, the amount of Employer Deferred Contributions to which Sherrill is entitled shall be determined in accordance with the following formula:

(a) his Total Compensation (as defined below) for the Plan Year;

MULTIPLIED BY

(b) the applicable percentage from the following schedule:

Portion of the Plan Year that His Age is:	% of Plan Eligible Compensation
54 but not 55 years	7.0%
55 but not 60 years	8.5%
60 years and over	10.0%

MULTIPLIED BY

(c) 1.50; and

REDUCED BY

(d) 2 percent of his Compensation (provided that the provisions of this paragraph (d) shall not apply for the period commencing on January 15, 2007 and ending on January 14, 2008).

For purposes of this Supplement A, "Total Compensation" for any Plan Year means Sherrill's Compensation for such Plan Year, determined (A) without regard to the limitations of section 401(a)(17) of the Code and (B) by adding the Bonus to the amount that would otherwise be Compensation for the Plan Year. Employer Deferred Contributions made on behalf of Sherrill for any Plan Year pursuant to this Supplement A shall be treated for all purposes under the Plan as Employer Deferred Contributions.

Other Terms of Plan	A-4. Except as otherwise provided in this Supplement A, the terms and conditions of the Plan shall apply to Sherrill.

SUPPLEMENT B
TO
TENNECO INC.
EXCESS BENEFIT PLAN

Application — B-1. This Supplement B to Tenneco Inc. Excess Benefit Plan shall apply as of January 15, 2007 to the benefits of Participant Kenneth Trammell (“Trammell”).

Definitions — B-2. Unless the context clearly implies or indicates the contrary, a word, term or phrase used or defined in the Plan is similarly used or defined for purposes of this Supplement B.

Employer Retirement Contributions — B-3. Trammell shall not be entitled to benefits pursuant to subsection 3.2 of the Plan and, in lieu thereof, he shall be entitled to Employer Deferred Contributions under the Plan in accordance with this Section B-3. For each Plan Year, the amount of Employer Deferred Contributions to which Trammell is entitled shall be determined in accordance with the following formula:

his Total Compensation (as defined below) for the Plan Year;

MULTIPLIED BY

(a) the applicable percentage from the following schedule:

Portion of the Plan Year that His Age is:	% of Plan Eligible Compensation
45 but not 50 y ears	6.0%
50 but not 55 years	7.0%
55 but not 60 years	8.5%
60 years and over	10.0%

MULTIPLIED BY

(b) 2.0; and

REDUCED BY

(c) his Compensation multiplied by the applicable percentage from the following schedule:

Portion of the Plan Year that His Age is:	% of Plan Eligible Compensation
45 but not 50 years	6.0%
50 but not 55 years	7.0%
55 but not 60 years	8.5%
60 years and over	10.0%

For purposes of this Supplement B, "Total Compensation" for any Plan Year means Trammell's Compensation for such Plan Year, determined (A) without regard to the limitations of section 401(a)(17) of the Code and (B) by adding the Bonus to the amount that would otherwise be Compensation for the Plan Year. Employer Deferred Contributions made on behalf of Trammell for any Plan Year pursuant to this Supplement B shall be treated for all purposes under the Plan as Employer Deferred Contributions.

<u>Other Terms of Plan</u> B-4. Except as otherwise provided in this Supplement B the terms and conditions of the Plan shall apply to Trammell.

SUPPLEMENT C
TO
TENNECO INC.
EXCESS BENEFIT PLAN

Application — C-1. This Supplement C to Tenneco Inc. Excess Benefit Plan shall apply as of January 6, 2015 to the benefits of Participant Brian J. Kesseler (“Kesseler”).

Definitions — C-2. Unless the context clearly implies or indicates the contrary, a word, term or phrase used or defined in the Plan is similarly used or defined for purposes of this Supplement C.

Employer Retirement Contributions — C-3. Kesseler's benefits under subsection 3.2 of the Plan shall be calculated in accordance with subsection 3.2 of the Plan except as follows;

(a) The Employer Bonus Contributions (as defined in subsection 3.2(b) of the Plan) to which Kesseler shall be entitled for any Plan Year shall be calculated in accordance with subsection 3.2(b) of the Plan; provided, however, that the Company Retirement Contribution percentage that will be applied to determine the amount of the Employer Bonus Contributions shall be 3%.

(b) The Employer Retirement Contributions (as defined in subsection 3.2(c) of the Plan) to which Kesseler shall be entitled for any Plan Year shall be calculated in accordance with subsection 3.2(c) of the Plan; provided, however, that the Company Retirement Contribution percentage that will be applied to determine the amount of the Employer Retirement Contributions shall be 3%.

Other Terms of Plan — C-4. Except as otherwise provided in this Supplement C the terms and conditions of the Plan shall apply to Kesseler.

EXHIBIT 12

TENNECO INC. AND CONSOLIDATED SUBSIDIARIES
COMBINED WITH 50% OWNED UNCONSOLIDATED SUBSIDIARIES
COMPUTATION OF RATIO OF EARNINGS TO FIXED CHARGES

	Years Ended December 31,				
	2017	2016	2015	2014	2013
	(Dollars in Millions)				
Net Income attributable to Tenneco Inc.	$ 207	$ 356	$ 241	$ 225	$ 182
Add:					
Interest expense	73	92	67	91	80
Portion of rentals representative of the interest factor	24	21	20	21	19
Income tax expense	70	—	146	131	122
Noncontrolling interests	67	68	54	44	38
Amortization of interest capitalized	5	4	4	4	4
Undistributed (earnings) losses of affiliated companies in which less than a 50% voting interest is owned	1	—	1	(1)	—
Earnings as defined	$ 447	$ 541	$ 533	$ 513	$ 445
Interest expense	$ 73	$ 92	$ 67	$ 91	$ 80
Interest capitalized	8	6	6	5	4
Portion of rentals representative of the interest factor	24	21	20	21	19
Fixed charges as defined	$ 105	$ 119	$ 93	$ 117	$ 103
Ratio of earnings to fixed charges	4.26	4.55	5.73	4.38	4.32

EXHIBIT 21

TENNECO INC.

Company Name	Ownership Type(a)	Primary Jurisdiction
Armstrong Properties (Pty.) Ltd.	Indirect	South Africa
Autopartes Walker, S. de R.L. de C.V.	Indirect	Mexico
CED'S Inc.	Indirect	Illinois
Clevite Industries Inc.	Indirect	Delaware
Fric-Rot S.A.I.C.	Indirect	Argentina
Futaba-Tenneco U.K. Limited	Indirect	United Kingdom
Gillet Exhaust Manufacturing Limited	Indirect	United Kingdom
Gillet Pressings Cardiff Limited	Indirect	United Kingdom
J.W. Hartley (Motor Trade) Limited	Indirect	United Kingdom
Kinetic Pty. Ltd.	Indirect	Australia
Maco Inversiones S.A.	Indirect	Argentina
McPherson Strut Company LLC	Indirect	Delaware
Monroe Amortisor Imalat Ve Ticaret Anonim Sirketi	Indirect	Turkey
Monroe Australia Pty. Limited	Indirect	Australia
Monroe Czechia s.r.o.	Indirect	Czech Republic
Monroe Manufacturing (Proprietary) Ltd.	Indirect	South Africa
Monroe Mexico, S. de R.L. de C.V.	Indirect	Mexico
Monroe Holding, S. de R.L. de C.V.	Indirect	Mexico
Monroe Packaging BVBA	Indirect	Belgium
Monroe Springs (Australia) Pty. Ltd.	Indirect	Australia
Monroe Springs (New Zealand) Limited	Indirect	New Zealand
Montagewerk Abgastechnik Emden GmbH	Indirect	Germany
Precision Modular Assembly Corp.	Indirect	Delaware
Proveedora Walker S. de R.L. de C.V.	Indirect	Mexico
Pullman Standard Inc.	Indirect	Delaware
Shanghai Tenneco Exhaust System Co., Ltd.	Indirect	China
TA (Australia) Group Pty. Ltd.	Indirect	Australia
Tenneco Asheville Inc.	Indirect	Delaware
Tenneco Asia Inc.	Indirect	Delaware
Tenneco Automotive Brasil Ltda.	Indirect	Brazil
Tenneco Automotive Deutschland GmbH	Indirect	Germany
Tenneco Automotive Eastern Europe Sp. z.o.o.	Indirect	Poland
Tenneco Automotive Europe BVBA	Indirect	Belgium
Tenneco Automotive Europe Coordination Center BVBA	Indirect	Belgium
Tenneco Automotive Foreign Sales Corporation Limited	Indirect	Jamaica
Tenneco Automotive France S.A.S.	Indirect	France
Tenneco Automotive Holdings South Africa Pty. Limited	Indirect	South Africa
Tenneco Automotive Iberica, S.A.	Indirect	Spain
Tenneco Automotive Inc. Nevada	Direct	Nevada
Tenneco Automotive India Private Limited	Indirect	India
Tenneco Automotive Italia S.r.l.	Indirect	Italy
Tenneco Automotie Nederland B.V.	Indirect	Netherlands
Tenneco Automotive Operating Company Inc.	Direct	Delaware
Tenneco Automotive Polska Sp. z.o.o.	Indirect	Poland
Tenneco Automotive Port Elizabeth (Proprietary) Limited	Indirect	South Africa
Tenneco Automotive Portugal - Componentes Para Automovel, Unipressol, LDA.	Indirect	Portugal

Company Name	Ownership Type(a)	Primary Jurisdiction
Tenneco Automotive Romania S.r.l.	Indirect	Romania
Tenneco Automotive RSA Company	Indirect	Delaware
Tenneco Automotive Second RSA Company	Indirect	Delaware
Tenneco Automotive Services Societe Par Actions Simplifiee	Indirect	France
Tenneco Automotive Servicios Mexico, S. de R.L. de C.V.	Indirect	Mexico
Tenneco Automotive (Thailand) Limited	Indirect	Thailand
Tenneco Automotive Trading Company	Indirect	Delaware
Tenneco Automotive UK Limited	Indirect	United Kingdom
Tenneco Automotive Volga LLC	Indirect	Russia
Tenneco Automotive Walker Inc.	Indirect	Delaware
Tenneco (Beijing) Exhaust System Co., Ltd.	Indirect	China
Tenneco (Beijing) Ride Control System Co., Ltd.	Indirect	China
Tenneco Brake, Inc.	Indirect	Delaware
Tenneco Brazil Ltda.	Indirect	Brazil
Tenneco Canada Inc.	Indirect	Canada
Tenneco (Changzhou) Rider Performance Co., Ltd.	Indirect	China
Tenneco (China) Co., Ltd.	Indirect	China
Tenneco (Dalian) Exhaust System Co. Ltd.	Indirect	China
Tenneco Deutschland Holdinggesellschaft mbH	Indirect	Germany
Tenneco Eastern European Holdings S.a.r.l.	Indirect	Luxembourg
Tenneco-Eberspaecher (Dalian) Exhaust System Co., Ltd.	Indirect	China
Tenneco Eberspaecher (Beijing) Exhaust System Co., Ltd.	Indirect	China
Tenneco Emission Control (Pty) Ltd.	Indirect	South Africa
Tenneco Etain Societe Par Actions Simplifiee	Indirect	France
Tenneco Europe Limited	Indirect	Delaware
Qingdao Tenneco FAWSN Automobile Parts Co., Ltd.	Indirect	China
Tenneco FAWSN (Foshan) Automobile Parts Co., Ltd.	Indirect	China
Tenneco FAWSN (Changchun) Automobile Parts Co., Ltd.	Indirect	China
Tenneco FAWSN (Tianjin) Automobile Parts Co., Ltd.	Indirect	China
Tenneco Fusheng (Chengdu) Automobile Parts Co., Ltd.	Indirect	China
Tenneco Global Holdings Inc.	Indirect	Delaware
Tenneco GmbH	Indirect	Germany
Tenneco (Guangzhou) Co., Ltd.	Indirect	China
Tenneco Holdings Danmark ApS	Indirect	Denmark
Tenneco Hong Kong Holdings Limited	Indirect	Hong Kong
Tenneco Hungary Korlatolt Felelossegu Tarasag	Indirect	Hungary
Tenneco Innovacion S. L.	Indirect	Spain
Tenneco International Holding Corp.	Indirect	Delaware
Tenneco International Luxembourg S.a.r.l.	Indirect	Luxembourg
Tenneco International Manufacturing S.a.r.l.	Indirect	Luxembourg
Tenneco Japan Ltd.	Indirect	Japan
Tenneco Korea Limited	Indirect	Korea
Tenneco Lingchuan (Chongqing) Exhaust System Co., Ltd.	Indirect	China
Tenneco Management (Europe) Limited	Indirect	United Kingdom
Tenneco (TM Asia) Ltd.	Indirect	Republic of China
Tenneco (TM Belgium) BVBA	Indirect	Belgium
Tenneco (MSCan) Operations Inc.	Indirect	Canada (BC)
Tenneco (MSCan) Operations Inc.	Indirect	Canada (BC)

Company Name	Ownership Type(a)	Primary Jurisdiction
Tenneco (MUSA)	Indirect	California
Tenneco Mauritius China Holdings Ltd.	Indirect	Mauritius
Tenneco Mauritius Holdings Limited	Indirect	Mauritius
Tenneco (Mauritius) Limited	Indirect	Mauritius
Tenneco Mexico, S. de R.L. de C.V.	Indirect	Mexico
Tenneco Ride Control South Africa (Pty) Ltd.	Indirect	South Africa
Tenneco Silesia spolka z ograniczona odpowiedzialnoscia	Indirect	Poland
Tenneco (Suzhou) Co., Ltd.	Indirect	China
Tenneco (Suzhou) Emission System Co., Ltd.	Indirect	China
Tenneco (Suzhou) Ride Control Co., Ltd.	Indirect	China
Tenneco Sverige AB	Indirect	Sweden
Tenneco (Tianjin) Rider Performance Co. Ltd.	Indirect	China
Tenneco Walker (Tianjin) Exhaust System Co., Ltd.	Indirect	China
Tenneco-Walker (U.K.) Limited	Indirect	United Kingdom
Tenneco Zwickau GmbH	Indirect	Germany
The Pullman Company	Indirect	Delaware
The Tenneco Automotive (UK) Pension Scheme Trustee Limited	Indirect	United Kingdom
Thompson and Stammers (Dunmow) Number 6 Limited	Indirect	United Kingdom
Thompson and Stammers (Dunmow) Number 7 Limited	Indirect	United Kingdom
TM S.r.l.	Indirect	Italy
TMC Texas Inc.	Indirect	Delaware
Walker Australia Pty. Limited	Indirect	Australia
Walker Danmark ApS	Indirect	Denmark
Walker Electronic Silencing, Inc.	Indirect	Delaware
Walker Europe, Inc.	Indirect	Delaware
Walker Exhaust (Thailand) Company Limited	Indirect	Thailand
Walker Gillet (Europe) GmbH	Indirect	Germany
Walker Limited	Indirect	United Kingdom
Walker Manufacturing Company	Indirect	Delaware
Walker UK Ltd	Indirect	United Kingdom
Wimetal Societe Par Actions Simplifiee	Indirect	France
Wuhan Tenneco Exhaust System Co., Ltd.	Indirect	China

(a) Ownership type indicates whether each subsidiary or affiliate is directly owned by Tenneco Inc., indirectly owned by a subsidiary of Tenneco Inc. (in each case, such subsidiary or affiliate may be partially or wholly owned), or a combination thereof.

EXHIBIT 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-17485, 333-41535, 333-33934, 333-101973, 333-113705, 333-142475, 333-159358 and 333-192928) of Tenneco Inc. of our report dated February 28, 2018 relating to the financial statements, financial statement schedule and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

Milwaukee, Wisconsin
February 28, 2018

Exhibit 24

TENNECO INC.
POWER OF ATTORNEY

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

/s/ Brian J. Kesseler

Name: Brian J. Kesseler

The undersigned does hereby appoint Brandon B. Smith and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

/s/ Kenneth R. Trammell

Name: Kenneth R. Trammell

The undersigned does hereby appoint Brandon B. Smith and Kenneth R. Trammell, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

/s/ Paul D. Novas

Name: Paul D. Novas

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

/s/ Gregg M. Sherrill

Name: Gregg M. Sherrill

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

/s/ Thomas C. Freyman

Name: Thomas C. Freyman

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

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/s/ Dennis J. Letham

Name: Dennis J. Letham

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

/s/ James S. Metcalf

Name: James S. Metcalf

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

/s/ Roger B. Porter

Name: Roger B. Porter

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

/s/ David B. Price, Jr.

Name: David B. Price, Jr.

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 28th day of February, 2018.

/s/ Paul T. Stecko

Name: Paul T. Stecko

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 6th day of February, 2018.

/s/ Jane L. Warner

Name: Jane L. Warner

The undersigned does hereby appoint Brandon B. Smith, Kenneth R. Trammell and Paul D. Novas, and each of them, with full power to act alone, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to execute the Annual Report on Form 10-K for the year ended December 31, 2017 of Tenneco Inc., including any and all amendments thereto, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any one of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, the undersigned has executed this instrument this 4th day of February, 2018.

/s/ Roger J. Wood

Name: Roger J. Wood

EXHIBIT 31.1

CERTIFICATION PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT

I, Brian J. Kesseler, certify that:

1. I have reviewed this annual report on Form 10-K of Tenneco Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officers and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
   c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
   d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officers and I have disclosed, based on our most recent evaluation of the registrant's internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
   a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
   b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ BRIAN J. KESSELER

Brian J. Kesseler

Chief Executive Officer

Dated: February 28, 2018

EXHIBIT 31.2

CERTIFICATION PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT

I, Kenneth R. Trammell, certify that:

1. I have reviewed this annual report on Form 10-K of Tenneco Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officers and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
    c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
    d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officers and I have disclosed, based on our most recent evaluation of the registrant's internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ KENNETH R. TRAMMELL

Kenneth R. Trammell

Executive Vice President and Chief Financial Officer

Dated: February 28, 2018

EXHIBIT 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the accompanying Annual Report on Form 10-K of Tenneco Inc. (the "Company") for the period ended December 31, 2017, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), and pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, Brian J. Kesseler, as Chief Executive Officer of the Company, and Kenneth R. Trammell, as Chief Financial Officer of the Company, hereby certify that:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ BRIAN J. KESSELER

Brian J. Kesseler
Chief Executive Officer

/s/ KENNETH R. TRAMMELL

Kenneth R. Trammell
Executive Vice President and Chief Financial Officer

February 28, 2018

This certification shall not be deemed "filed" by the Company for purposes of Section 18 of the Securities Exchange Act of 1934. In addition, this certification shall not be deemed to be incorporated by reference into any filing under the Securities Exchange Act of 1933 or the Securities Exchange Act of 1934.

A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.