TENNECO INC
Form 10-K
February 24, 2016
Table of Contents

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

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

For the fiscal year ended December 31, 2015
OR

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

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 (Address of principal executive offices)	60045 (Zip Code)

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

Title of each class	Name of each Exchange on which registered
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 þ No ¨
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ¨ No þ
Note — Checking the box above will not relieve any registrant required to file reports pursuant to Section 13 or 15(d) of the Exchange Act from their obligations under those Sections.
Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes þ No ¨
Indicate by check mark whether the registrant has submitted electronically 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 þ No ¨
Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ¨
Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting

company" in Rule 12b-2 of the Exchange Act.

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

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant as of June 30, 2015, 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, 2015, was approximately $3.4 billion.

Common Stock, par value $.01 per share, outstanding as of February 19, 2016 was 57,514,337.

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 18, 2016	Part III

Table of Contents

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 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, such as the prolonged recession in Europe;
- 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, including our European cost reduction initiatives, and to realize anticipated benefits from these plans;
- economic, exchange rate and political conditions in the countries where we operate or sell our products;
- industrywide strikes, labor disruptions at our facilities or any labor or other economic disruptions at any of our significant customers or suppliers or any of our customers' other suppliers;
- 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;
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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;
- 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;

Table of Contents

- our ability to realize our business strategy of improving operating performance;
- our ability to successfully integrate 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 the 2011 earthquake in Japan and flooding in Thailand, 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.

Table of Contents

TABLE OF CONTENTS

Table of Contents

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 18, 2016.

Independence of Directors

- Eight of our nine 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.
- 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.

Corporate Governance Principles

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

5

Table of Contents

Stock Ownership Guidelines

- We have adopted Stock Ownership Guidelines to align the interests of our executives with the interests of stockholders and promote our commitment to sound corporate governance.
- The Stock Ownership Guidelines apply to the independent directors, the Chairman and Chief Executive Officer, and all other officers with a rank of Vice President 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 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. We will continue to review this policy as final rulemaking is adopted regarding clawbacks under the Dodd-Frank Wall Street Reform and Consumer Protection Act.

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, 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.

6

Table of Contents

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 six operating segments (North America Clean Air, North America Ride Performance, Europe, South America and India Clean Air, Europe, South America and India 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.

Net Sales and Operating Revenues:

	2015		2014		2013	
	(Dollar Amounts in Millions)					
Clean Air Division						
North America	$2,867	35 %	$2,840	34 %	$2,666	33 %
Europe, South America & India	1,935	23 %	2,088	25 %	2,045	26 %
Asia Pacific	1,037	13 %	1,022	12 %	853	11 %
Intergroup sales	(116)	(1)%	(139)	(2)%	(120)	(2)%
Total Clean Air Division	5,723	70 %	5,811	69 %	5,444	68 %
Ride Performance Division						
North America	1,323	16 %	1,361	16 %	1,265	16 %
Europe, South America & India	972	12 %	1,070	13 %	1,087	14 %
Asia Pacific	275	3 %	269	3 %	251	3 %
Intergroup sales	(84)	(1)%	(91)	(1)%	(83)	(1)%
Total Ride Performance Division	2,486	30 %	2,609	31 %	2,520	32 %
Total Tenneco Inc.	$8,209	100 %	$8,420	100 %	$7,964	100 %

EBIT:

	2015		2014		2013	
	(Dollar Amounts in Millions)					
Clean Air Division						
North America	$244	47 %	$237	48 %	$229	54 %
Europe, South America & India	52	10 %	59	12 %	57	13 %
Asia Pacific	121	23 %	101	21 %	84	20 %
Total Clean Air Division	417	80 %	397	81 %	370	87 %
Ride Performance Division						
North America	155	30 %	143	29 %	124	29 %
Europe, South America & India	(5)	(1)%	40	8 %	(7)	(1)%
Asia Pacific	39	8 %	36	7 %	22	5 %
Total Ride Performance Division	189	37 %	219	44 %	139	33 %

Other	(87)	(17)%	(124)	(25)%	(85)	(20)%
Total Tenneco Inc.	$519	100 %	$492	100 %	$424	100 %

Table of Contents

Expenditures for Plant, Property and Equipment:

	2015			2014			2013		
	(Dollar Amounts in Millions)								
Clean Air Division									
North America	$95	32	%	$83	26	%	$76	30	%
Europe, South America & India	74	25	%	84	26	%	61	24	%
Asia Pacific	43	15	%	56	18	%	44	17	%
Total Clean Air Division	212	72	%	223	70	%	181	71	%
Ride Performance Division									
North America	34	12	%	35	11	%	32	13	%
Europe, South America & India	42	14	%	47	15	%	33	13	%
Asia Pacific	6	2	%	10	3	%	6	2	%
Total Ride Performance Division	82	28	%	92	29	%	71	28	%
Other	1	—	%	2	1	%	2	1	%
Total Tenneco Inc.	$295	100	%	$317	100	%	$254	100	%

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

	2015	2014	2013
	(Millions)		
Interest expense (net of interest capitalized)	$67	$91	$80
Income tax expense	149	131	122
Noncontrolling interests	56	44	39

Table of Contents

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 $8.2 billion in 2015. 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 of 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 moderate but slowing pace over the past three years, increasing 4% in 2013, 3% in 2014 and 1% in 2015. The overall rate of growth in 2015 was largely impacted by the South America and Japan production declines of 21% and 5%, respectively. Of these regions, South America has the biggest impact on Tenneco and continues to struggle with political and economic turmoil. IHS Automotive projects global light

vehicle production will grow 3% in 2016. Production of commercial trucks globally and off-highway equipment in regulated regions has weakened over the past three years with production increasing 4% in 2013, about flat in 2014 and declining 7% in 2015. IHS and Power Systems Research forecast these markets to decline 1% in 2016.

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 adopted over the past decade require substantial reductions in vehicle tailpipe criteria pollutant

Table of Contents

emissions, longer warranty periods for a vehicle's pollution control equipment and additional equipment to control fuel vapor emissions. The products that our clean air division provides reduce the tailpipe emissions of criteria pollutants. In addition, new 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 in all regions such as China, India, Thailand 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®. New 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 $146 million in 2015, $169 million in 2014, and $144 million in 2013, net of customer reimbursements. Such expenses reimbursed by our customers totaled $145 million in 2015, $159 million in 2014, and $169 million in 2013, 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. Tenneco, through an exclusive partnership with Jiangsu Lvyuan in China, has become the first company to obtain China Classification Society (CCS) approval to sell marine selective catalytic reduction systems for China flagged vessels, as required by the International Maritime

Organization. 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) suspension and Kinetic® ride control, and Actively Controlled Car (ACOCAR)™. In

Table of Contents

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, 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, China and Thailand. 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 will grow from 53 percent of global OE production in 2015 to 57 percent in 2020 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

Table of Contents

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 2015, 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 a few years, including Advance Auto Parts' purchase of Carquest (which included WorldPac), Auto Zone's purchase of Interamerican Motor Company, O'Reilly Auto Parts' purchase of V.I.P. to expand their entrance into the Northeast U.S. market, and Icahn Enterprises L.P.'s agreement to acquire Pep Boys. 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 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.

Analysis of Revenues

The table below provides, for each of the years 2013 through 2015, information relating to our net sales and operating revenues, by primary product lines and customer categories.

	Net Sales Year Ended December 31,		
	2015	2014	2013
	(Millions)		
Clean Air Products & Systems			
Aftermarket	$318	$318	$327
Original Equipment			
OE Value-add	3,489	3,559	3,282
OE Substrate(1)	1,916	1,934	1,835
	5,405	5,493	5,117
	5,723	5,811	5,444
Ride Performance Products & Systems			
Aftermarket	941	976	953
Original Equipment	1,545	1,633	1,567
	2,486	2,609	2,520
Total Revenues	$8,209	$8,420	$7,964

(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 control components.

Table of Contents

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 2015, we served more than 80 different OEMs and commercial truck and off-highway engine manufacturers worldwide, and our products were included on nine of the top 10 passenger car models produced for sale in Europe and eight of the top 10 light truck models produced for sale in North America for 2015.

During 2015, 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	Beijing Automotive
Caterpillar	AvtoVAZ	BMW
CNH Industrial	BMW	Brilliance Automobile
Daimler AG	Caterpillar	Chang'an Automotive
FCA	CNH Industrial (Iveco)	China National Heavy-Duty Truck Group
Ford Motor	Daimler AG	Daimler AG
General Motors	Deutz AG	Dongfeng Motor
Harley-Davidson	FCA	Deutz AG
Honda Motors	Ford Motor	First Auto Works
Hyundai Motor	Geely Automobile	Ford Motor
John Deere	General Motors	Geely Automobile
Navistar International	John Deere	General Motors
Nissan Motor	Mazda Motor	Great Wall Motor
Paccar	McLaren Automotive	Isuzu Motor Company
Toyota Motor	Nissan Motor	Jiangling Motors
Volkswagen Group	Paccar	JND
Volvo Global Truck	PSA Peugeot Citroen	Kubota
	Renault	Nissan Motor
	Suzuki Motor	SAIC Motor
	Tata Motors	Toyota Motor
	Toyota Motor	Weichai Power
	Volkswagen Group	Yuchai Group
	Volvo Global Truck	

Table of Contents

Australia	South America	India
Ford Motor	Agrale S.A.	Ashok Leyland
General Motors	CNH Industrial (Iveco)	BMW
Toyota Motor	Daimler AG	Daimler AG
	FCA	Ford Motor
	Ford Motor	General Motors
	General Motors	Mahindra & Mahindra
	Navistar International	Nissan Motor
	Nissan Motor	Suzuki Motor
	PSA Peugeot Citroen	Tata Motors
	Randon S.A.	Toyota Motor
	Renault	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	2015		2014		2013	
General Motors Company	15	%	15	%	15	%
Ford Motor Company	13	%	13	%	14	%

During 2015, 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), Advance Auto Parts, Uni-Select, O'Reilly Auto Parts, Aftermarket Auto Parts Alliance, and AutoZone in North America, Temot Autoteile GmbH, Autodistribution International, Group Auto Union, Auto Teile Ring and AP United in Europe and Rede Presidente in South America. We believe our aftermarket revenue mix is balanced, with our top 10 aftermarket customers accounting for 63 percent of our net aftermarket sales and our aftermarket sales representing 15 percent of our total net sales in 2015.

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.

14

Table of Contents

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 30 light vehicle manufacturers for use on over 225 light vehicle models, including six of the top 10 passenger car models produced in Europe and seven of the top 10 light truck

models produced in North America for 2015. 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, Harley-Davidson, John Deere, Kubota, Scania and Weichai Power.

Table of Contents

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 CVSA2 and ACOCAR™ that electronically adjust a vehicle's performance based on certain inputs such as steering and braking;

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 for use on over 195 light vehicle models, including eight of the top 10 passenger car models produced in Europe and eight of the top 10 light truck models produced in North America for 2015. We also supply ride performance products and systems to over 40 manufacturers of commercial truck, off-highway and other vehicles including Volvo Truck, Scania, Navistar, Daimler Trucks and Paccar.

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 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.

Table of Contents

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 team provides the appropriate mix of operational and technical expertise needed to interface successfully with the OEMs. Our new 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 Walker®, Monroe®, Rancho®, DynoMax®, Monroe® brake brands and our heavy-duty products.

Manufacturing and Engineering

We focus on achieving superior product quality at the lowest operating costs possible using productive, reliable and safe manufacturing processes to achieve that goal. Our manufacturing strategy centers on a lean production system called the Tenneco Manufacturing System (TMS), that is designed to eliminate waste, develop skills, share best practices and lead our manufacturing enterprise to reduce overall costs, while maintaining quality standards and reducing manufacturing cycle time. As part of TMS, we use Six Sigma techniques both in manufacturing and design to minimize product defects and improve operational efficiencies. 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 63 clean air manufacturing facilities worldwide, of which 14 facilities are located in North America, 25 in Europe, South America and India, and 24 in Asia Pacific. We operate 18 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.

Within each of our clean air manufacturing facilities, operations are organized by component (e.g., muffler, catalytic converter, pipe, resonator and manifold). Our manufacturing systems incorporate cell-based designs, allowing work-in-process to move through the operation with greater speed and flexibility. We continue to invest in plant and equipment to stay competitive in the industry. For instance, in our Smithville, Tennessee, OE manufacturing facility, we have developed a muffler assembly cell that utilizes laser welding. This allows for quicker change-over times in

the process as well as less material used and less weight for the product. There is also a reduced cycle time compared to traditional joining and increased manufacturing precision for superior durability and performance. In 2007, we introduced the Measured and Matched Converter technique in North America. This allows us to maintain the optimum GBD (Gap Bulk Density) in our converter manufacturing operations with Tenneco proprietary processing. This process, coupled with cold spinning of the converter body, versus traditional cone to can welding, allows for more effective use of material through reduced welding, lower cost, and better performance of the product. In 2009, we introduced low-cost fabricated diesel manifolds in Europe which utilize advanced manufacturing processes such as deep drawing, laser welding, and furnace brazing.

Table of Contents

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 two facilities are located in North America, ten in Europe and India, and 13 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 30 ride performance manufacturing facilities worldwide, of which nine facilities are located in North America, 15 in Europe, South America and India, and six 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, South America and India, 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

Table of Contents

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 Business Policy Manual. The Global Business Policy Manual complies with the ISO/TS 16949:2009, ISO 9001:2008 specifications, and customers' specific requirements. 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. Each employee is expected to follow the relevant standards, policies, and procedures contained in the Global Business Policy 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 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 Continuously Variable Semi Active ("CVSA") electronic suspension shock absorbers, which we co-developed with Öhlins Racing AB, are now sold to Volvo, Audi, Mercedes, VW, BMW, and Ford, among others, and our engineered elastomers to manufacturers with unique 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.

Table of Contents

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 15 percent of our total annual OE revenues in both 2015 and 2014.

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 competitively cutting-edge products around the world. After adding to our footprint in China, Japan and Thailand from 2011 to 2012, we opened our clean air manufacturing facility in Chakan, India located close to key customers in the Pune region in 2013. In 2014, we opened our clean air research and development facility in Kunshan, China to enhance our engineering capabilities and develop China-specific solutions. 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 shock absorbers 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.

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.

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® shock absorbers, 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 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 spring and the upper mount into a single, complete module and 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 we do business in.

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

Table of Contents

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 positioned ourselves as a leading exhaust supplier in the rapidly growing Asian region through our operations in China, India and Thailand. We increased our investment from 80 percent to 100 percent in Tenneco Tongtai Exhaust Company Limited (TTEC) located in Dalian in the fourth quarter of 2013.

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 2012, we signed an exclusive joint development agreement with Cormetech Inc., a joint equity company of Corning Inc. and Mitsubishi Heavy Industries Ltd, to design ultra-large diameter SCR catalysts for marine, locomotive and certain stationary applications. Also in 2012, we signed a nonexclusive Joint Development and Licensing Agreement with Amminex for the design and development of Solid SCR™ systems.

In February 2014, we secured the exclusive rights to the digital valve technology used in our DRiV™ suspension systems from Sturman Industries, Inc. DRiV™ systems feature electronically controlled dampers with hydraulic valves that can be used in a variety of vehicle damping applications.

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.

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. We still expect to reach our target annual savings rate in 2016, however the recent dramatic changes in exchange rates will likely have an impact on the actual savings achieved when translated from Euros to U.S. dollars. We incurred $78 million in restructuring and related costs in 2013, of which $69 million was related to this initiative including $3 million for non-cash asset write downs. In 2014, we incurred $49 million in restructuring and related costs, of which $31 million was related to this initiative including $3 million for non-cash asset write downs. In 2015, we incurred $63 million in restructuring and related costs, of which $22 million was related to this initiative. While we are nearing the completion of this initiative, we expect to incur additional restructuring and related costs in 2016 due to 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 are currently engaged in a sale process to identify potential purchasers for the facility and intend to continue operating it until a complete transfer of ownership takes place. 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. 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.

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

We estimate that we and our subsidiaries will make expenditures for plant, property and equipment for environmental matters of approximately $6 million in 2016 and $2 million in 2017.

Table of Contents

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 to the consolidated financial statements of Tenneco Inc. included in Item 8.

Employees

As of December 31, 2015, we had approximately 30,000 employees of whom approximately 45 percent were covered by collective bargaining agreements. European works councils cover 16 percent of our total employees, a majority of whom are also included under collective bargaining agreements. Several of our existing labor agreements in Mexico and the United States are scheduled for renegotiation in 2016. In addition, agreements covering plants in Argentina, Brazil and Thailand are expiring in 2016. 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 and assembly to best cost countries, as well as 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.

Table of Contents

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, and European production remains below pre-crisis levels. More recently, light vehicle and commercial truck production has declined significantly in South America in 2014 and 2015 and persistent challenges in the Chinese economy going into 2016 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 continues to be 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.

We are subject to investigations by antitrust regulators and developments in these investigations and related matters could have a material adverse effect on our consolidated financial position, results of operations or liquidity.

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 antitrust laws can result in significant penalties being imposed by antitrust authorities. Costs, charges and liabilities arising out of or related to these investigations and related claims can also be significant.

Antitrust authorities are investigating possible violations of antitrust laws by multiple automotive parts suppliers, including Tenneco. At this point, we cannot estimate the ultimate impact on our company from investigations into our antitrust compliance and related matters but, in light of the uncertainties and many variables involved in such investigations and potential related claims, we cannot assure you that the outcome of these and other investigations and related claims will not be material to Tenneco's consolidated financial position, results of operations or liquidity.

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 also impact the demand for new

light vehicle purchases. 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.

Table of Contents

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 fiscal year ended December 31, 2015, GM and Ford accounted for 15 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 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, and European production remains below pre-crisis levels. More recently, light vehicle and commercial truck production has declined significantly in South America in 2014 and 2015 and persistent challenges in the Chinese economy going into 2016 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 seek additional financing or sell assets. Without such financing, 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.

Table of Contents

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. 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 savings and improvements.

We regularly implement strategic and other initiatives designed to improve our operating performance. For example, in 2013 we announced a cost reduction initiative in Europe to significantly reduce our annual structural costs in the region. 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, particularly since 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, where light vehicle production declined in 2012 and continues to remain below pre-crisis level. 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. For example, our consolidated results of operations were negatively impacted in 2015 primarily due to the strengthening of the U.S. dollar against the Euro, Chinese Yuan, Canadian dollar, Argentine Peso, and the Brazilian Real.

Table of Contents

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.

In the past, we have experienced significant increases and fluctuations in raw materials pricing; and future changes in the prices of raw materials or utility services could have a material adverse impact on us without proportionate recovery from our customers.

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. 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 as well as by strategically pursuing regional and global purchasing strategies for specific commodities, and aggressively negotiating to recover these higher costs from our customers. 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 increased prices in the future or, if we do, whether these 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

Table of Contents

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. 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 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

Table of Contents

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.

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 has 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 15 percent of our net sales in both the fiscal years ended December 31, 2015 and 2014.

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 will perform as planned or prove to be beneficial to our operations and cash flow. 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.

Table of Contents

We are subject to risks related to our international operations.

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, 2015, approximately 49 percent of our net sales were derived from operations outside North America. 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;
- hyperinflation in certain foreign 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
- requirements for manufacturers to use locally produced goods.

Regulations related to conflict-free minerals may force us to incur additional expenses and otherwise adversely impact our business.

In August 2012, as mandated by the Dodd-Frank Wall Street Reform and Consumer Protection Act, the SEC adopted final rules regarding disclosure of the use of certain minerals, known as conflict minerals, originating from the Democratic Republic of Congo (DRC) or adjoining countries. These new requirements require ongoing due diligence efforts, with initial disclosure requirements that began in May 2014. Our supply chain is complex and we may incur significant costs to determine the source of any such minerals used in our products. We may also incur costs with respect to potential changes to products, processes or sources of supply as a consequence of our diligence activities. Further, the implementation of these rules and their effect on customer, supplier and/or consumer behavior could adversely affect the sourcing, supply and pricing of materials used in our products. As there may be only a limited number of suppliers offering conflict-free minerals, we cannot be sure that we will be able to obtain necessary minerals from such suppliers in sufficient quantities or at competitive prices. We may face reputational challenges if we determine that certain of our products contain minerals not determined to be conflict-free or if we are unable to sufficiently verify the origins for all conflict minerals used in our products through the procedures we implement. Accordingly, the implementation of these rules could have a material adverse effect on our business, results of operations and/or financial condition.

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 the discounted future cash flows of the related business, the goodwill is considered impaired and is reduced to fair value by a non-cash charge to earnings. 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 did not record any non-cash asset impairment charges during the fiscal years ended December 31, 2013, 2014 or 2015.

Table of Contents

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

As of December 31, 2015, we had approximately $211 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.

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 63 manufacturing facilities worldwide, of which 14 facilities are located in North America, 25 in Europe, South America and India, and 24 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 30 manufacturing facilities worldwide, of which nine facilities are located in North America, 15 in Europe, South America and India, and six 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 sales offices located in Singapore and Taiwan.

We own 49 and lease 64 of the properties described above. We hold 18 of the above-described international manufacturing facilities through nine 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.

ITEM 3.LEGAL PROCEEDINGS.

We are involved in environmental remediation matters, legal proceedings, claims, investigations and warranty obligations. 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

Table of Contents

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, 2015, we have the obligation to remediate or contribute towards the remediation of certain sites, including one Federal Superfund site. At December 31, 2015, 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 1.8 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 2016, $1 million each year beginning 2017 through 2020 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

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. We cannot provide any assurance as to when such actions will be filed in the future or how they will ultimately be resolved.

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.

Antitrust law investigations and related matters often continue for several years and can result in significant penalties and liability. At this point, we cannot estimate the ultimate impact on our company from investigations into our antitrust compliance and related matters in light of the uncertainties and many variables involved, and there can be no assurance that the ultimate resolution of these matters, including any civil litigation claims, will not have a material

adverse effect on our consolidated financial position, results of operations or liquidity.

Other Legal Proceedings, Claims and Investigations

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, employment matters, and commercial or contractual disputes, sometimes related to acquisitions or divestitures.

Table of Contents

Additionally, some of these matters involve allegations relating to legal compliance. For example, one of our Argentine subsidiaries is currently defending itself against a criminal complaint alleging the failure to comply with laws requiring the proceeds of export transactions to be collected, reported and/or converted to local currency within specified time periods. As another example, in the U.S. we are subject to an audit in 11 states with respect to the payment of unclaimed property to those states, spanning a period as far back as over 30 years. While we vigorously defend ourselves against all of these legal proceedings, claims and investigations and take other actions to minimize our potential exposure, in future periods, we could be subject to cash costs or charges to earnings if any of these matters are resolved on unfavorable terms. Although the ultimate outcome of any legal matter cannot be predicted with certainty, based on current information, including our assessment of the merits of the particular claim, except as described above under "Antitrust Investigations," we do not expect the legal proceedings, claims or investigations currently pending against us will have any material adverse impact on our consolidated financial position, results of operations or liquidity.

In addition, 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, 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.

ITEM 4.MINE SAFETY DISCLOSURES.

Not applicable.

Table of Contents

ITEM 4.1.EXECUTIVE OFFICERS OF THE REGISTRANT.

The following provides information concerning the persons who serve as our executive officers as of February 24, 2016.

Name and Age	Offices Held
Gregg M. Sherrill (63)	Chairman and Chief Executive Officer
Brian J. Kesseler (49)	Chief Operating Officer
Josep Fornos (63)	Executive Vice President, Enterprise Business Initiatives
Timothy E. Jackson (59)	Executive Vice President, Technology, Strategy and Business Development
Kenneth R. Trammell (55)	Executive Vice President and Chief Financial Officer
Gregg Bolt (56)	Senior Vice President, Global Human Resources and Administration
Peng (Patrick) Guo (50)	Senior Vice President and General Manager, Asia Pacific
James D. Harrington (55)	Senior Vice President, General Counsel and Corporate Secretary
Henry Hummel (48)	Senior Vice President and General Manager, Clean Air Division
Enrique Orta (44)	Senior Vice President, Ride Performance Division
Joseph A. Pomaranski (60)	Senior Vice President and General Manager, Global Aftermarket
John E. Kunz (50)	Vice President and Controller

Gregg M. Sherrill — 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 Operating Officer in January 2015. 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.

Josep Fornos - Mr. Fornos was named Executive Vice President, Enterprise Business Initiatives in September 2015. He served as Executive Vice President, Clean Air Division from October 2014 to September 2015. Prior to that, Mr. Fornos served as Executive Vice President, Ride Performance Division from February 2013 to October 2014, as Executive Vice President and General Manager, Europe, South America and India from March 2012 to February 2013 and as Senior Vice President and General Manager, Europe, South America and India from July 2010 to March 2012. Prior to that, he had served as Vice President and General Manager, Europe Original Equipment Emission Control since March 2007. Mr. Fornos joined Tenneco in July 2000 as Vice President and General Manager, Europe Original Equipment Ride Control. Prior to joining Tenneco, Fornos spent a year at Lear Corporation as General Manager of the company's seating and wire and harness business in France, following Lear's acquisition of United Technologies Automotive. Mr. Fornos spent 16 years with United Technologies Automotive, holding several management positions in production, engineering and quality control in Spain and later having Europe-wide responsibility for engineering and quality control.

Timothy E. Jackson — Mr. Jackson has served as Executive Vice President, Technology, Strategy and Business Development since March 2012. He served as our Senior Vice President and Chief Technology Officer from March 2007 to March 2012. Prior to that, Mr. Jackson served as our Senior Vice President — Global Technology and General Manager, Asia Pacific since July 2005. From 2002 to 2005, Mr. Jackson served as Senior Vice President —

Manufacturing, Engineering, and Global Technology. In August 2000, he was named Senior Vice President — Global Technology, a role he served in after joining us as Senior Vice President and General Manager — North American Original Equipment and Worldwide Program Management in June 1999. Mr. Jackson came to Tenneco from ITT Industries where he was President of that company's Fluid Handling Systems Division. With over 30 years of management experience, 25 within the automotive industry, he had also served as Chief Executive Officer for HiSan, a joint venture between ITT Industries and Sanoh Industrial Company. Mr. Jackson has also held senior management positions at BF Goodrich Aerospace and General Motors Corporation.

Table of Contents

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.

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.

Peng (Patrick) Guo - Mr. Guo has served as Senior Vice President and General Manager, Asia Pacific since October 2014. Prior to this appointment, Mr. Guo served as Vice President and Managing Director, China since 2007. 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.

James D. Harrington — Mr. Harrington has served as our Senior Vice President, General Counsel and Corporate Secretary since June 2009 and is responsible for managing our worldwide legal affairs including corporate governance and compliance. Mr. Harrington joined us in January 2005 as Corporate Counsel and was named Vice President — Law in July 2007. Prior to joining Tenneco, he worked at Mayer Brown LLP in the firm’s corporate and securities practice.

Henry Hummel - Mr. Hummel was named Senior Vice President and General Manager, Clean Air Division in September 2015. He is responsible for leading Tenneco's Clean Air product line. Mr. Hummel joined Tenneco from GE Healthcare where, since October 2014, he had been serving as President and CEO of molecular imaging and computed tomography, leading the company's $3.5 billion global business focused on diagnostic imaging equipment and services. He had been with GE Healthcare for more than 20 years, managing global business and functions including operations, strategic planning, new product introductions, technology and business integration. In addition to his time with GE Healthcare, Mr. Hummel also spent time with Johnson Controls, Inc., serving as Vice President and General Manager Service North America and Covance, as Vice President and General Manager of the company's Madison, Wisconsin laboratories.

Enrique Orta - Mr. Orta was named Senior Vice President, Ride Performance Division in May 2015. He is responsible for leading Tenneco's Ride Performance product line. Prior to that, Mr. Orta serviced as Vice President and General Manager, Europe Clean Air from July 2010 to May 2015, as Executive Operations Director, Europe Emission Control from June 2008 to July 2010 and as Executive Operations Director, Europe Emission Control from February 2008 to June 2008. Mr. Orta joined Tenneco in 1995 as financial controller and HR manager at the company's newly acquired Valencia, Spain Clean Air plant.

Joseph A. Pomaranski - Mr. Pomaranski has served as our Senior Vice President and General Manager, Global Aftermarket since October 2014. Prior to this appointment, Mr. Pomaranski served as Vice President and General Manager, North America Aftermarket since November 2010. He served as Vice President, North America Aftermarket from August 2008 to November 2010. Prior to that, Mr. Pomaranski served as Vice President, North America Aftermarket Sales from May 1999 to August 2008. Mr. Pomaranski joined Tenneco in 1999 from Federal Mogul where he held the position of Director of Sales, Special Markets. Prior to that, he worked for Cooper Automotive as Vice President of Sales. He began his career with Champion Spark Plug where he held various positions from 1977 to 1998.

John E. Kunz — Mr. Kunz has served as our Vice President and Controller since March 2015 and is our company's principal accounting officer with responsibility for Tenneco's corporate accounting and financial reporting globally. Prior to assuming his role as Controller, Mr. Kunz served as Vice President, Treasurer and Tax, responsible for our company's global tax function. Mr. Kunz also oversaw our company's treasury, insurance and investment activities including building and managing relationships with the banking community and rating agencies. Mr. Kunz joined Tenneco in 2004 from Great Lakes Chemical Corporation, where he rose through responsibility to become vice

president and treasurer. Prior to joining Great Lakes in 1999, Mr. Kunz was director of corporate development at Weirton Steel Corporation, where he also held prior positions in capital planning, business development and financial analysis. Prior to that, Mr. Kunz spent four years with the international public accounting firm of KPMG.

Table of Contents

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
2015		
1st	$59.87	$49.14
2nd	61.73	55.01
3rd	58.20	39.13
4th	57.18	44.15
2014		
1st	$62.75	$52.21
2nd	67.69	56.10
3rd	69.22	52.20
4th	58.08	46.64

As of February 19, 2016, there were approximately 15,712 holders of record of our common stock, including brokers and other nominees.

The declaration of dividends on our common stock is at the discretion of our Board of Directors. The Board has not adopted a dividend policy as such; subject to legal and contractual restrictions, its decisions regarding dividends are based on all considerations that in its business judgment are relevant at the time. These considerations may include past and projected earnings, cash flows, economic, business and securities market conditions and anticipated developments concerning our business and operations.

Relative to many of our peers in the auto parts industry, we are more highly leveraged and our debt agreements contain certain restrictions on the payment of dividends depending upon the ratio of our earnings to our debt. We have not paid dividends on our common stock since the fourth quarter of 2000. There are no current plans to reinstate a dividend on our common stock. 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 2015. 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	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 2015	1,065,919	$48.55	1,065,919	$340
November 2015	58,345	$56.13	57,951	$337
December 2015	32	$50.50	—	$337

Total	1,124,296	1,123,870	$337

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. We anticipate completing the additional $200 million share repurchase program by the end of 2017.

Table of Contents

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., Borg Warner 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.

	12/31/2010	12/31/2011	12/31/2012	12/31/2013	12/31/2014	12/31/2015
Tenneco Inc.	100.00	72.35	85.30	137.44	137.54	111.54
S&P 500	100.00	102.11	118.45	156.82	178.29	180.75
Peer Group	100.00	78.45	92.10	145.18	156.60	123.67

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.

Table of Contents

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, South America and India; and Asia Pacific), resulting in six operating segments (North America Clean Air, North America Ride Performance, Europe, South America and India Clean Air, Europe, South America and India 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."

Table of Contents

TENNECO INC. AND CONSOLIDATED SUBSIDIARIES
SELECTED CONSOLIDATED FINANCIAL DATA

	Year Ended December 31,				
	2015(a)	2014(b)	2013(c)	2012(d)	2011(e)
	(Millions Except Share and Per Share Amounts)				
Statements of Income Data:					
Net sales and operating revenues —					
Clean Air Division					
North America	$2,867	$2,840	$2,666	$2,512	$2,291
Europe, South America & India	1,935	2,088	2,045	1,827	1,952
Asia Pacific	1,037	1,022	853	695	625
Intergroup sales	(116)	(139)	(120)	(108)	(107)
Total Clean Air Division	5,723	5,811	5,444	4,926	4,761
Ride Performance Division					
North America	1,323	1,361	1,265	1,223	1,135
Europe, South America & India	972	1,070	1,087	1,094	1,217
Asia Pacific	275	269	251	213	179
Intergroup sales	(84)	(91)	(83)	(93)	(87)
Total Ride Performance Division	2,486	2,609	2,520	2,437	2,444
Total Tenneco Inc.	$8,209	$8,420	$7,964	$7,363	$7,205
Earnings before interest expense, income taxes, and noncontrolling interests —					
Clean Air Division					
North America	$244	$237	$229	$202	$172
Europe, South America & India	52	59	57	$54	$79
Asia Pacific	121	101	84	$71	$47
Total Clean Air Division	417	397	370	$327	$298
Ride Performance Division					
North America	155	143	124	$122	$76
Europe, South America & India	(5)	40	(7)	$41	$69
Asia Pacific	39	36	22	$5	$(6)
Total Ride Performance Division	189	219	139	$168	$139
Other	(87)	(124)	(85)	(67)	(58)
Total Tenneco Inc.	$519	$492	$424	428	379
Interest expense (net of interest capitalized)	67	91	80	105	108
Income tax expense	149	131	122	19	88
Net income	303	270	222	304	183
Less: Net income attributable to noncontrolling interests	56	44	39	29	26
Net income attributable to Tenneco Inc.	$247	$226	$183	$275	$157
Weighted average shares of common stock outstanding —					
Basic	59,678,309	60,734,022	60,474,492	59,985,677	59,884,139
Diluted	60,193,150	61,782,508	61,594,062	61,083,510	61,520,160
Basic earnings per share of common stock	$4.14	$3.72	$3.03	$4.58	$2.62
Diluted earnings per share of common stock	$4.11	$3.66	$2.97	$4.50	$2.55

Table of Contents

	Years Ended December 31,				
	2015	2014	2013	2012	2011
	(Millions Except Ratio and Percent Amounts)				
Balance Sheet Data (at year end):					
Total assets(f)	$3,967	$3,996	$3,817	$3,593	$3,317
Short-term debt	86	60	83	113	66
Long-term debt(f)	1,124	1,055	1,006	1,052	1,138
Redeemable noncontrolling interests	43	35	20	15	12
Total Tenneco Inc. shareholders' equity	433	497	433	246	—
Noncontrolling interests	42	41	39	45	43
Total equity	475	538	472	291	43
Statement of Cash Flows Data:					
Net cash provided by operating activities	$517	$341	$503	$365	$245
Net cash used by investing activities	(303)	(339)	(266)	(273)	(224)
Net cash provided (used) by financing activities	(172)	20	(175)	(89)	(26)
Cash payments for plant, property and equipment	(286)	(328)	(244)	(256)	(213)
Other Data:					
EBITDA including noncontrolling interests(g)	$722	$700	$629	$633	$586
Ratio of EBITDA including noncontrolling interests to interest expense	10.78	7.69	7.86	6.03	5.43
Ratio of net debt (total debt less cash and cash equivalents) to EBITDA including noncontrolling interests(h)	1.28	1.19	1.29	1.49	1.69
Ratio of earnings to fixed charges(i)	5.85	4.41	4.34	3.55	3.10

NOTE: Our consolidated financial statements for the three years ended December 31, 2015, which are discussed in the following notes, are included in this Form 10-K under Item 8.

(a) 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. 2015 also includes $4 million in charges related to pension benefits.

(b) 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.

(c) 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.

(d) 2012 includes a $7 million asset impairment charge related to certain assets of our European Ride Performance business and a benefit of $5 million from property recoveries related to transactions originated by The Pullman

Company before being acquired by Tenneco in 1996.

(e) During the third quarter of 2011, we recorded a goodwill impairment charge of $11 million related to our Australian reporting unit within the Asia Pacific segment.

(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

Table of Contents

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 $12 million, $14 million, $13 million, $15 million and $20 million at December 31, 2015, 2014, 2013, 2012 and 2011, respectively.

(g) 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,				
	2015	2014	2013	2012	2011
	(Millions)				
Net income	$247	$226	$183	$275	$157
Noncontrolling interests	56	44	39	29	26
Income tax expense	149	131	122	19	88
Interest expense, net of interest capitalized	67	91	80	105	108
Depreciation and amortization of other intangibles	203	208	205	205	207
Total EBITDA including noncontrolling interests	$722	$700	$629	$633	$586

(h) 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,				
	2015	2014	2013	2012	2011
	(Millions)				
Total Debt	$1,210	$1,115	$1,089	$1,165	$1,204
Total Cash	288	285	280	223	214
Net Debt	$922	$830	$809	$942	$990

(i) 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.

40

Table of Contents

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 nine of the top 10 car models produced for sale in Europe and eight of the top 10 light truck models produced for sale in North America for 2015. Our aftermarket customers are comprised of full-line and specialty warehouse distributors, retailers, jobbers, installer chains and car dealers. As of December 31, 2015, we operated 93 manufacturing facilities worldwide and employed approximately 30,000 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 2015, 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 North America, six percent in India, and four percent in both Europe and China. South America light vehicle production was down 21 percent and Australia was down two percent from 2014 levels.

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, South America and India; and Asia Pacific), resulting in six operating segments (North America Clean Air, North America Ride Performance, Europe, South America and India Clean Air, Europe, South America and India 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."

Total revenue for 2015 was $8,209 million, a three percent decrease from $8,420 million in 2014. Excluding the impact of currency and substrate sales, revenue was up $315 million from $6,486 million to $6,801 million, driven primarily by stronger OE light vehicle volumes in North America, Europe, India and China, increased aftermarket sales in North America and South America and new platforms in Europe, China and Japan, which were partially offset by lower commercial truck, off-highway and other revenue mainly in South America and China.

Cost of sales: Cost of sales for 2015 was $6,845 million, or 83.4 percent of sales, compared to $7,025 million, or 83.4 percent of sales in 2014. The following table lists the primary drivers behind the change in cost of sales ($ millions).

Year ended December 31, 2014	$7,025
Volume and mix	471
Material	(120)
Currency exchange rates	(521)
Restructuring	—

Other Costs	(10)
Year ended December 31, 2015	$6,845

The decrease in cost of sales was due to the impact of currency exchange rates, lower net material costs, and lower other costs, mainly manufacturing, partially offset by the year-over-year increase in volume.

Table of Contents

Gross margin: Revenue less cost of sales for 2015 was $1,364 million, or 16.6 percent of sales, versus $1,395 million, or 16.6 percent of sales in 2014. The effect on gross margin resulting from year-over-year increase in volume, lower net material costs and lower other costs, mainly manufacturing, was more than offset by unfavorable currency.
Engineering, research and development: Engineering, research and development expense was $146 million and $169 million in 2015 and 2014, respectively, mainly due to currency impact and the timing of customers' recoveries.
Selling, general and administrative (SG&A): Selling, general and administrative expense was down $28 million in 2015, at $491 million, compared to $519 million in 2014, mainly due to currency impact.
Depreciation and amortization: Depreciation and amortization expense was $203 million and $208 million for 2015 and 2014, respectively.
Earnings before interest expense, taxes and noncontrolling interests (“EBIT”) was $519 million for 2015, an increase of $27 million, when compared to $492 million in the prior year. Higher OE light vehicle volumes in North America, Europe, India and China, increased aftermarket sales in North America and South America, new platforms in Europe, China and Japan, the benefit of our product cost leadership initiatives and savings from previous restructuring activities were partially offset by lower commercial truck, off-highway and other revenue mainly in South America and China, unfavorable mix, higher restructuring costs and $64 million of negative currency. EBIT for 2015 also benefited from the timing of a customer recovery in China Clean Air of $5 million. EBIT for 2014 included a $7 million adjustment to workers' compensation reserves.
Results from Operations
Net Sales and Operating Revenues for Years 2015 and 2014
The tables below reflect our revenues for 2015 and 2014. 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 2014 table since this is the base period for measuring the effects of currency during 2015 on our operations. We believe investors find this information useful in understanding period-to-period comparisons in our revenues.

Table of Contents

	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	$2,851	$1,007	$1,844	$(5)	$1,849
Europe, South America & India	1,835	664	1,171	(236)	1,407
Asia Pacific	1,037	245	792	(28)	820
Total Clean Air Division	5,723	1,916	3,807	(269)	4,076
Ride Performance Division					
North America	1,313	—	1,313	(29)	1,342
Europe, South America & India	944	—	944	(195)	1,139
Asia Pacific	229	—	229	(15)	244
Total Ride Performance Division	2,486	—	2,486	(239)	2,725
Total Tenneco Inc.	$8,209	$1,916	$6,293	$(508)	$6,801

	Year Ended December 31, 2014				
	Revenues	Substrate Sales	Value-add Revenues	Currency Impact on Value-add Revenues	Value-add Revenues excluding Currency
	(Millions)				
Clean Air Division					
North America	$2,815	$1,045	$1,770	$—	$1,770
Europe, South America & India	1,974	668	1,306	—	1,306
Asia Pacific	1,022	221	801	—	801
Total Clean Air Division	5,811	1,934	3,877	—	3,877
Ride Performance Division					
North America	1,351	—	1,351	—	1,351
Europe, South America & India	1,032	—	1,032	—	1,032
Asia Pacific	226	—	226	—	226
Total Ride Performance Division	2,609	—	2,609	—	2,609
Total Tenneco Inc.	$8,420	$1,934	$6,486	$—	$6,486

Table of Contents

	Year Ended December 31, 2015 Versus Year Ended December 31, 2014 Dollar and Percent Increase (Decrease)			
	Revenues	Percent	Value-add Revenues excluding Currency	Percent
	(Millions Except Percent Amounts)			
Clean Air Division				
North America	$36	1 %	$79	4 %
Europe, South America & India	(139)	(7)%	101	8 %
Asia Pacific	15	1 %	19	2 %
Total Clean Air Division	(88)	(2)%	199	5 %
Ride Performance Division				
North America	(38)	(3)%	(9)	(1)%
Europe, South America & India	(88)	(9)%	107	10 %
Asia Pacific	3	1 %	18	8 %
Total Ride Performance Division	(123)	(5)%	116	4 %
Total Tenneco Inc.	$(211)	(3)%	$315	5 %

Light Vehicle Industry Production by Region for Years Ended December 31, 2015 and 2014 (According to IHS Automotive, January 2016)

	Year Ended December 31,			
	2015	2014	Increase (Decrease)	% Increase (Decrease)
	(Number of Vehicles in Thousands)			
North America	17,497	17,029	468	3 %
Europe	20,918	20,151	767	4 %
South America	3,034	3,818	(784)	(21)%
India	3,805	3,594	211	6 %
Total Europe, South America & India	27,757	27,563	194	1 %
China	23,580	22,610		