PPG INDUSTRIES INC
Form 10-K
February 16, 2017

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

FORM 10-K
ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF
THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2016   Commission File Number 1-1687
PPG INDUSTRIES, INC.
(Exact name of registrant as specified in its charter)

Pennsylvania	25-0730780
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
One PPG Place, Pittsburgh, Pennsylvania	15272
(Address of principal executive offices)	(Zip code)
Registrant’s telephone number, including area code:	412-434-3131

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 $1.66 $^{2}/_{3}$	New York Stock Exchange
0.000% Notes due 2019	New York Stock Exchange
0.875% Notes due 2022	New York Stock Exchange
0.875% Notes due 2025	New York Stock Exchange
1.400% Notes due 2027	New York Stock Exchange

Securities Registered Pursuant to Section 12(g) of the Act: None

Indicate by check mark if the Registrant is a well-known seasoned issuer as defined in Rule 405 of the Securities Act. YES x   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 x
Indicate by check mark whether the Registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months, and (2) has been subject to such filing requirements for the past 90 days. YES x   NO ¨
Indicate by checkmark whether the registrant has submitted electronically and posted on its corporate web site, if any, every Interactive Date File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). YES x   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. (Check one):
Large accelerated filer x   Accelerated filer ¨

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

Indicate by check mark whether the Registrant is a shell company (as defined by Rule 12b-2 of the Act). YES o NO x

The aggregate market value of common stock held by non-affiliates as of June 30, 2016, was $27,771 million.
As of January 31, 2017, 257,094,500 shares of the Registrant's common stock, with a par value of 1.66^2/_3$ per share, were outstanding. As of that date, the aggregate market value of common stock held by non-affiliates was $25,682 million.

DOCUMENTS INCORPORATED BY REFERENCE

Document	Incorporated By Reference In Part No.
Portions of PPG Industries, Inc. Proxy Statement for its 2017 Annual Meeting of Shareholders	III

PPG INDUSTRIES, INC.
AND CONSOLIDATED SUBSIDIARIES

As used in this report, the terms “PPG,” “Company,” “Registrant,” “we,” “us” and “our” refer to PPG Industries, Inc., and its subsidiaries, taken as a whole, unless the context indicates otherwise.

TABLE OF CONTENTS

Note on Incorporation by Reference
Throughout this report, various information and data are incorporated by reference from the Company’s 2016 Annual Report (hereinafter referred to as “the Annual Report”). Any reference in this report to disclosures in the Annual Report shall constitute incorporation by reference only of that specific information and data into this Form 10-K.

Part I
Item 1. Business
PPG Industries, Inc., manufactures and distributes a broad range of coatings and specialty materials. PPG was incorporated in Pennsylvania in 1883.
PPG's vision is to be the world's leading coatings company by consistently delivering high-quality, innovative and sustainable solutions that customers trust to protect and beautify their products and surroundings.
PPG's business is comprised of three reportable business segments: Performance Coatings, Industrial Coatings and Glass.
In October 2016, PPG completed the sale of its flat glass business. As such, all historical information has been recast to present the flat glass business as discontinued operations and assets held for sale. Refer to Note 2, "Acquisitions and Divestitures" under Item 8 of this Form 10-K for further information relating to this transaction.
Performance Coatings and Industrial Coatings
PPG is a major global supplier of coatings. The Performance Coatings and Industrial Coatings reportable segments supply coatings and specialty materials for customers in a wide array of end-use markets, including industrial equipment and components, packaging material; aircraft and marine equipment; automotive original equipment ("automotive OEM"); as well as for other industrial and consumer products. In addition to supplying coatings to the automotive OEM market, PPG supplies refinishes to the automotive aftermarket. PPG also serves commercial and residential new build and maintenance markets by supplying coatings to painting and maintenance contractors and directly to consumers for decoration and maintenance. The coatings industry is highly competitive and consists of several large firms with global presence and many smaller firms serving local or regional markets. PPG competes in its primary markets with the world's largest coatings companies, most of which have global operations, and many smaller regional coatings companies.
Performance Coatings
The Performance Coatings reportable segment is comprised of the refinish, aerospace, protective and marine, architectural – Americas and Asia Pacific and architectural – EMEA coatings businesses.
The refinish coatings business supplies coatings products for automotive and commercial transport/fleet repair and refurbishing, light industrial coatings and specialty coatings for signs. These products are sold primarily through independent distributors.
The aerospace coatings business supplies coatings, sealants and transparencies for commercial, military, regional jet and general aviation aircraft, and transparent armor for specialty applications and provides chemical management services for the aerospace industry. PPG supplies products to aircraft manufacturers and maintenance and aftermarket customers around the world both on a direct basis and through a company-owned distribution network.
The protective and marine coatings business supplies coatings and finishes for the protection of metals and structures to metal fabricators, heavy duty maintenance contractors and

manufacturers of ships, bridges and rail cars. These products are sold through company-owned architectural coatings stores, independent distributors and directly to customers.
The architectural coatings-Americas and Asia Pacific business primarily produces coatings used by painting and maintenance contractors and by consumers for decoration and maintenance of residential and commercial building structures. These coatings are sold under a number of brands, including PPG®, GLIDDEN®, COMEX®, OLYMPIC®, DULUX® (in Canada), SIKKENS®, PPG PITTSBURGH PAINTS®, MULCO®, FLOOD®, LIQUID NAILS®, SICO®, CIL®, RENNER®, TAUBMANS®, WHITE KNIGHT®, BRISTOL®, , and HOMAX®. Architectural coatings – Americas and Asia Pacific products are sold through a combination of company-owned stores, home centers and other regional or national consumer retail outlets, paint dealers, concessionaires, independent distributors and directly to customers. At the end of 2016, the architectural coatings-Americas and Asia Pacific business operated about 920 company-owned stores in North America, about 40 company-owned stores in Australia and about 75 company-owned stores in Central America. In addition, PPG sells coatings and related products through more than 4,200 stores that are independently owned and operated by approximately 700 concessionaires, primarily in Mexico.
The architectural coatings – EMEA business supplies a variety of coatings and purchased sundries to painting contractors and consumers in Europe, the Middle East and Africa. The coatings are sold under a number of brands,

including SIGMA®, HISTOR®, SEIGNEURIE®, GUITTET®, PEINTURES GAUTHIER®, RIPOLIN®, JOHNSTONE'S®, LEYLAND®, PRIMALEX®, DEKORAL®, TRILAK®, PROMINENT PAINTS®, GORI®, and BONDEX®. Architectural coatings – EMEA products are sold through a combination of about 690 company-owned stores, regional home centers, paint dealers, and independent distributors and directly to customers.

Price, product performance, technology, quality, distribution, brand recognition and technical and customer service are major competitive factors in the performance coatings businesses.

The major global competitors of the Performance Coatings reportable segment are Akzo Nobel N.V., Axalta Coating Systems Ltd., BASF Corporation, Benjamin Moore, Hempel A/S, the Jotun Group, Masco Corporation, Materis Paints, Nippon Paint; RPM International Inc, the Sherwin-Williams Company, and Valspar Corporation. The average number of persons employed by the Performance Coatings reportable segment during 2016 was about 28,400.

Industrial Coatings

The Industrial Coatings reportable segment is comprised of the automotive OEM, industrial coatings, packaging coatings, coatings services and specialty coatings and materials businesses. Industrial, automotive OEM, packaging coatings, and specialty coatings and materials products are formulated specifically for the customers' needs and application methods.

The industrial and automotive OEM coatings businesses sell directly to a variety of manufacturing companies. PPG also supplies adhesives and sealants for the automotive industry and metal pretreatments and related chemicals for industrial and automotive applications. PPG's industrial coatings business produces coatings for appliances, agricultural and construction equipment, consumer electronics, automotive parts and accessories, building products (including residential and commercial construction), transportation vehicles and numerous other finished products. PPG's automotive OEM coatings business was the first to introduce breakthrough automotive coating technologies such as cathodic electrocoat, powder clearcoat, compact paint systems and factory-applied spray-in bedliners, and the Company has a continued focus on innovation leadership. PPG has established alliances with Kansai Paints to serve Japanese-based automotive OEM customers in North America and Europe and Asian Paints Ltd. to serve certain aftermarket customers and automotive OEMs in India.

The packaging coatings business supplies coatings to a variety of manufacturing companies. Packaging coatings are widely used for the protection, performance and decoration of metal cans, closures, plastic tubes, industrial packaging, and promotional and specialty packaging.

The coatings services business applies coatings to customers' manufactured parts and assembled products. It operates on-site coatings services within several customer manufacturing locations, as well as at regional service centers. Customers ship parts to service centers where they are treated to enhance paint adhesion and painted with electrocoat, powder or liquid coatings technologies. Coated parts are then shipped to the customer's next stage of assembly.

Price, product performance, technology, cost effectiveness, quality and technical and customer service are major competitive factors in the industrial, automotive OEM, packaging coatings, and coatings services businesses.

The primary specialty coatings and materials products are amorphous precipitated silicas for tire, battery separator and other end-use markets; TESLIN® substrate used in such applications as radio frequency identification (RFID) tags and labels, e-passports, drivers' licenses and identification cards; Organic Light Emitting Diode (OLED) materials for use in displays and lighting; optical lens materials and photochromic dyes for optical lenses and color-change products.

Product quality and performance, distribution and technical service are the most critical competitive factors to the specialty coatings and materials business.

The major global competitors of the Industrial Coatings reportable segment are Akzo Nobel N.V., Axalta Coating Systems Ltd., BASF Corporation, Kansai Paints, Nippon Paint and Valspar Corporation. The average number of persons employed by the Industrial Coatings reportable segment during 2016 was about 13,400.

Glass

The Glass reportable segment is comprised of the North American fiber glass business. During 2016, PPG divested its European fiber glass business and its ownership interest in two Asian fiber glass joint ventures. Refer to Note 2, "Acquisitions and Divestitures" under Item 8 of this Form 10-K for further information relating to these transactions.

PPG's major fiber glass markets are commercial and residential construction and the wind energy, energy infrastructure, transportation and electronics industries. Most fiber glass products are sold directly to manufacturing companies. PPG manufactures fiber glass by the continuous-strand process.

Price, quality, technology and customer service are the key competitive factors in the North American fiber glass business. The Company competes with many major producers of fiber glass, including CPIC Fiberglass, Johns Manville Corporation, Jushi Group, Owens Corning and Taishan Fiberglass.

Excluding divested businesses, the average number of persons employed by the Glass reportable segment during 2016 was about 1,100.

Strategic Acquisitions

Since the filing of our 2015 Form 10-K, the Performance Coatings and Industrial Coatings segments announced and completed several strategic acquisitions, as follows:

Performance Coatings

On January 20, 2017, PPG acquired certain assets of automotive refinish coatings company Futian Xinshi (Futian), based in the Guangdong province of China. Futian distributes its products in China through a network of more than 200 distributors. Futian had sales of approximately $15 million in 2016.

On January 5, 2017, PPG completed the acquisition of DEUTEK S.A., a leading Romanian paint and architectural coatings manufacturer, from the Emerging Europe Accession Fund. DEUTEK, established in 1993, manufactures and markets a large portfolio of well-known professional and consumer paint brands, including OSKAR and Danke!. The company's products are sold in more than 120 do-it-yourself stores and 3,500 independent retail outlets in Romania. DEUTEK reported sales of 30 million euros in 2015.

On November 11, 2016, PPG purchased the 50% ownership interest in PPG Univer S.p.A from its joint-venture partner, Univer Italiana S.r.l. PPG Univer S.p.A manufactures architectural and liquid industrial coatings employs about 150 people. It operates a network of 12 retail stores in Italy and maintains administrative offices and a production facility in the town of Cavallirio, Italy. PPG Univer S.p.A. had sales of approximately 30 million euros in 2016.

Industrial Coatings

In July 2016, PPG completed the acquisition of MetoKote Corporation. MetoKote is a U.S.-based coatings services business with 2015 global sales of approximately $200 million. MetoKote applies coatings to customers' manufactured parts and assembled products. It operates on-site coatings services within several customer manufacturing locations, as well as at regional service centers, located throughout the U.S., Canada, Mexico, the United Kingdom, Germany, Hungary and the Czech Republic. Customers ship parts to MetoKote service centers where they are treated to enhance paint adhesion and painted with electrocoat, powder or liquid coatings technologies. MetoKote coats an average of more than 1.5 million parts per day. Beginning in July 2016, the financial results of MetoKote are reported as the coatings services operating segment.

Raw Materials and Energy

The effective management of raw materials and energy is important to PPG's continued success. The Company's most significant raw materials are epoxy and other resins, titanium dioxide and other pigments, and solvents in the coatings businesses; sand and soda ash for the specialty coatings and materials business; and sand and clay in the North American fiber glass business. Coatings raw materials, which include both organic, primarily petroleum based, materials and inorganic materials, including titanium dioxide, comprise between 70% and 80% of the Company's cost of sales, excluding depreciation and amortization, in most coatings formulations and represent PPG's single largest production cost component.

Most of the raw materials and energy used in production are purchased from outside sources, and the Company has made, and plans to continue to make, supply arrangements to meet the planned operating requirements for the future. Supply of critical raw materials and energy is managed by establishing contracts, multiple sources, and identifying alternative materials or technology whenever possible. Our products use both petroleum-derived and bio-based materials as part of a product renewal strategy. While prices for these raw materials typically fluctuate with energy prices, such fluctuations are impacted by the fact that the manufacture of our raw materials is several steps downstream from crude oil and natural gas.

The Company is continuing its aggressive sourcing initiatives to broaden our supply of high quality raw materials. These initiatives include qualifying multiple and local sources of supply, including suppliers from Asia and other lower cost regions of the world, adding on-site resin production at certain manufacturing locations and a reduction in the amount of titanium dioxide used in our product formulations.

Our global efforts to reduce titanium dioxide consumption have been successful to date and are expected to continue. Titanium dioxide is a raw material widely used in the paint and coatings industry as a pigment to provide hiding, durability and whiteness characteristics. PPG purchases both sulfate-grade and chloride-grade titanium dioxide from suppliers for use in coatings formulations. The Company has undertaken a strategic initiative to secure and enhance PPG's supply of titanium dioxide, as well as to minimize PPG's use of this raw material. PPG possesses intellectual property and expertise in the production and finishing of titanium dioxide pigment. PPG intends to continue to leverage this technology and intends to develop innovative supply solutions through technical collaborations, joint ventures and licensing arrangements with other interested parties.

PPG signed a license agreement with Henan Billions Chemicals Co., Ltd. ("Billions"), under which PPG has licensed certain chloride-based titanium dioxide technologies for use at Billions' titanium dioxide refinement facilities in China. In addition, PPG has signed long-term purchase agreements for chloride-grade and sulfate-grade titanium dioxide with Billions. In late 2015, PPG began using chloride-grade titanium dioxide produced by Billions using PPG's licensed chloride-based technology. PPG's usage of Billions' chloride-grade titanium dioxide increased in 2016. PPG is using the chloride-grade titanium dioxide to produce standard grades of coatings products. Under the license agreement, Billions has the right to sell chloride-based titanium dioxide to other parties.

We are subject to existing and evolving standards relating to the registration of chemicals which could potentially impact the availability and viability of some of the raw materials we use in our production processes. Our ongoing global product stewardship efforts are directed at maintaining our compliance with these standards.

Changes to chemical registration regulations have been proposed or implemented in the EU and many other countries, including China, Canada, the United States, and Korea. Because implementation of many of these programs has not been finalized, the financial impact cannot be estimated at this time. We anticipate that the number of chemical registration regulations will continue to increase globally, and we have implemented programs to track and comply with these regulations.

Given the recent volatility in certain energy-based input costs and foreign currencies, the Company is not able to predict with certainty the 2017 full year impact of related changes in raw material pricing; however, PPG currently expects overall coatings raw material prices to increase modestly in 2017, with impacts varied by region and commodity. Further, given the distribution nature of many of our businesses, logistics and distribution costs are sizable, as are wages and benefits but to a lesser degree. In aggregate, raw material feedstock prices in 2016 were lower, including oil-related products, although some products experienced price inflation late in the year. Since oil is traded in U.S. dollars globally, the strengthening of the dollar against a wide variety of foreign currencies reduced some of the oil-related benefits in certain regions, and in certain cases resulted in inflationary raw material prices.

Research and Development

Technology innovation has been a hallmark of PPG's success throughout its history. Research and development costs, including depreciation of research facilities, were $487 million, $494 million and $499 million during 2016, 2015 and

2014, respectively, and totaled approximately 3% of annual sales in each year. We have obtained government funding for a small portion of the Company's research efforts, and we will continue to pursue government funding where appropriate.

PPG owns and operates several facilities to conduct research and development relating to new and improved products and processes. In addition to the Company's centralized principal research and development centers (See Item 2 of this Form 10-K), operating segments manage their development through centers of excellence. As part of our ongoing efforts to manage our formulations and raw material costs effectively, we operate a global competitive sourcing laboratory in China. Because of the Company's broad array of products and customers, PPG is not materially dependent upon any single technology platform.

The Company seeks to optimize its investment in research and development to create new products to drive profitable growth. We align our product development with the macro trends in the end-use markets we serve and leverage core technology platforms to develop products for unmet market needs. Our history of successful technology introductions is based on a commitment to an efficient and effective innovation process and disciplined portfolio management.

Patents

PPG considers patent protection to be important; however, the Company's reportable business segments are not materially dependent upon any single patent or group of related patents. PPG earned $15 million, $20 million and $29 million in 2016, 2015 and 2014, respectively, from royalties and the sale of technical know-how.

Backlog
In general, PPG does not manufacture its products against a backlog of orders. Production and inventory levels are geared primarily to projections of future demand and the level of incoming orders.
Global Operations
PPG has a significant investment in non-U.S. operations. This broad geographic footprint serves to lessen the significance of economic impacts occurring in any one region on PPG's total net sales and income from continuing operations. As a result of our expansion outside the U.S., we are subject to certain inherent risks, including economic and political conditions in international markets and fluctuations in foreign currency exchange rates. During 2016, unfavorable foreign currency reduced net sales by approximately $400 million.
Our net sales in the developed and emerging regions of the world for the years ended December 31st are summarized below:

($ in millions)	Net Sales		
	2016	2015	2014
United States, Canada, Western Europe	$10,196	$10,145	$10,657
Latin America, Central and Eastern Europe, Middle East, Africa, Asia Pacific	4,555	4,621	4,134
Total	$14,751	$14,766	$14,791

Refer to Note 19, "Reportable Business Segment Information" under Item 8 of this Form 10-K for geographic information related to PPG's property, plant and equipment, and for additional geographic information pertaining to sales.
Seasonality
PPG's income from continuing operations has typically been greater in the second and third quarters and cash from operating activities has been greatest in the fourth quarter due to end-use market seasonality, primarily in PPG's architectural coatings businesses. Demand for PPG's architectural coatings products is typically the strongest in the second and third quarters due to higher home improvement, maintenance and construction activity during the spring and summer months in the U.S. and Canada and Europe. The Latin America paint season is the strongest in the fourth quarter. These higher activity levels result in higher outstanding receivables that are collected in the fourth quarter generating higher fourth quarter cash from operating activities.
Employee Relations
The average number of persons employed worldwide by PPG during 2016 was about 47,000. The Company has numerous collective bargaining agreements throughout the world. We observe local customs, laws and practices in labor relations when negotiating collective bargaining agreements. There were no significant work stoppages in 2016. While we have experienced occasional work stoppages as a result of the collective bargaining process and may experience some work stoppages in the future, we believe that we will be able to negotiate all labor agreements on satisfactory terms. To date, these work stoppages have not had a significant impact on PPG's results of operations. Overall, the Company believes it has good relationships with its employees.

Environmental Matters
PPG is subject to existing and evolving standards relating to protection of the environment. PPG is negotiating with various government agencies concerning 126 current and former manufacturing sites and offsite waste disposal locations, including 24 sites on the National Priority List. While PPG is not generally a major contributor of wastes to these offsite waste disposal locations, each potentially responsible party may face governmental agency assertions of joint and several liability. Generally, however, a final allocation of costs is made based on relative contributions of wastes to the site. There is a wide range of cost estimates for cleanup of these sites, due largely to uncertainties as to the nature and extent of their condition and the methods that may have to be employed for their remediation. The Company has established reserves for onsite and offsite remediation of those sites where it is probable that a liability has been incurred and the amount of loss can be reasonably estimated.
The Company's experience to date regarding environmental matters leads it to believe that it will have continuing expenditures for compliance with provisions regulating the protection of the environment and for present and future remediation efforts at waste and plant sites. Management anticipates that such expenditures will occur over an extended period of time.

In addition to the $285 million currently reserved for environmental remediation efforts, we may be subject to loss contingencies related to environmental matters estimated to be approximately $100 million to $200 million. These reasonably possible unreserved losses relate to environmental matters at a number of sites, none of which are individually significant. The loss contingencies related to these sites include significant unresolved issues such as the nature and extent of contamination at these sites and the methods that may have to be employed to remediate them.
Capital expenditures for environmental control projects were $18 million, $15 million and $14 million in 2016, 2015, and 2014, respectively. It is expected that expenditures for such projects in 2017 will be in the range of $10 million to $20 million. Although future capital expenditures are difficult to estimate accurately because of constantly changing regulatory standards and policies, it can be anticipated that environmental control standards will become increasingly stringent and the cost of compliance will increase.
In management’s opinion, the Company operates in an environmentally sound manner, is well positioned, relative to environmental matters, within the industries in which it operates and the outcome of these environmental contingencies will not have a material adverse effect on PPG’s financial position or liquidity; however, any such outcome may be material to the results of operations of any particular period in which costs, if any, are recognized. See Note 13, “Commitments and Contingent Liabilities,” under Item 8 of this Form 10-K for additional information related to environmental matters and our accrued liability for estimated environmental remediation costs.
Public and governmental concerns related to climate change continue to grow, leading to efforts to limit the greenhouse gas (“GHG”) emissions believed to be responsible. While PPG has operations in many countries, a substantial portion of PPG’s

GHG emissions are generated by locations in the U.S., where considerable legislative and regulatory activity has been taking place. PPG has, and will continue to, annually report our global GHG emissions to the voluntary Carbon Disclosure project.

Since PPG's GHG emissions arise principally from combustion of fossil fuels and the purchase of electricity, PPG has for some time recognized the desirability of reducing energy consumption and GHG generation. For the three year period ended December 31, 2016, including the flat glass facilities divested October 1, 2016, energy consumption intensity was reduced by 30% and GHG emission generation intensity was reduced by 22%.

PPG participates in both the U.S. Department of Energy, BETTER BUILDINGS®, BETTER PLANTS® program, formerly the SAVE ENERGY NOW® Leadership program, and the Environmental Protection Agency ENERGY STAR® Industrial Partnership program, both reinforcing the company's voluntary efforts to significantly reduce its industrial energy intensity. These programs include developing and implementing energy management processes and setting energy savings targets while providing a suite of educational, training, and technical resources to help meet those targets. Recognizing the continuing importance of this matter, PPG has a senior management group with a mandate to guide the Company's progress in this area.

PPG's public disclosure on energy security and climate change can be viewed in our Sustainability Report at sustainability.ppg.com or at the Carbon Disclosure Project www.cdp.net.

Available Information

The Company's website address is www.ppg.com. The Company posts, and shareholders may access without charge, the Company's recent filings and any amendments thereto of its annual reports on Form 10-K, quarterly reports on Form 10-Q and its proxy statements as soon as reasonably practicable after such reports are filed with the Securities and Exchange Commission ("SEC"). The Company also posts all financial press releases, including earnings releases, to its website. All other reports filed or furnished to the SEC, including reports on Form 8-K, are available via direct link on PPG's website to the SEC's website, www.sec.gov. Reference to the Company's and the SEC's websites herein does not incorporate by reference any information contained on those websites and such information should not be considered part of this Form 10-K.

Item 1A. Risk Factors

As a global manufacturer of coatings, specialty materials and fiber glass products, we operate in a business environment that includes risks. These risks are not unlike the risks we have faced in the recent past nor are they unlike risks faced by our competitors. Each of the risks described in this section could adversely affect our results of operations, financial position and liquidity. While the factors listed here are considered to be the more significant factors, no such list should be considered to be a complete statement of all potential risks and uncertainties. Unlisted factors may present significant additional obstacles which may adversely affect our businesses and our results of operations.

Increases in prices and declines in the availability of raw materials could negatively impact our financial results.

Our financial results are significantly affected by the cost of raw materials. Coatings raw materials, which include both organic, primarily petroleum based, materials and inorganic materials, including titanium dioxide, comprise between 70% and 80% of the Company's cost of sales, exclusive of depreciation and amortization, sold in most coatings formulations and represent PPG's single largest production cost component.

While not our customary practice, we also import raw materials and intermediates, particularly for use at our manufacturing facilities in the emerging regions of the world. In most cases, those imports are priced in the currency of the supplier and, therefore, if that currency strengthens against the currency of our manufacturing facility, our margins may be lower.

Most of our raw materials are purchased from outside sources, and the Company has made, and plans to continue to make, supply arrangements to meet the planned operating requirements for the future. Adequate supply of critical raw materials is managed by establishing contracts, procuring from multiple sources, and identifying alternative materials or technology whenever possible. The Company is continuing its aggressive sourcing initiatives to effectively broaden our supply of high quality raw materials. These initiatives include qualifying multiple and local sources of supply, including suppliers from Asia and other lower cost regions of the world, adding on-site resin production at certain manufacturing locations, and a reduction in the amount of titanium dioxide and other raw materials used in our product formulations. Our products use both petroleum-derived and bio-based materials as part of a product renewal strategy.

An inability to obtain critical raw materials would adversely impact our ability to produce products. Increases in the cost of raw materials may have an adverse effect on our income from continuing operations or cash from operating activities in the event we are unable to offset these higher costs in a timely manner.

The pace of economic growth and level of uncertainty could have a negative impact on our results of operations and cash flows.

During 2016, overall economic conditions remained mixed among the major global economies. PPG provides products and services to a variety of end-use markets in many geographies. This broad end-use market exposure and expanded geographic presence lessens the significance of any individual decrease in activity levels; nonetheless, lower demand levels may result in lower sales, which would result in reduced income from continuing operations and cash from operating activities.

Refer to Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations” of this Form 10-K for discussion of the economic conditions in 2016 and our outlook on certain economic conditions in 2017.

We are subject to existing and evolving standards relating to the protection of the environment.

Environmental laws and regulations control, among other things, the discharge of pollutants into the air and water, the handling, use, treatment, storage and clean-up of hazardous and non-hazardous waste, the investigation and remediation of soil and groundwater affected by hazardous substances, and regulate various health and safety matters. The environmental laws and regulations we are subject to impose liability for the costs of, and damages resulting from, cleaning up current sites, past spills, disposals and other releases of hazardous substances. Violations of these laws and regulations can also result in fines and penalties. Future environmental laws and regulations may require substantial capital expenditures or may require or cause us to modify or curtail our operations, which may have a material adverse impact on our business, financial condition and results of operations.

As described in Note 13, “Commitments and Contingent Liabilities,” under Item 8 of this Form 10-K, we are currently undertaking environmental remediation activities at a number of our current and former facilities and properties, the cost of which is substantial. In addition to the amounts currently reserved, we may be subject to loss contingencies related to environmental matters estimated to be as much as $100 million to $200 million. Such unreserved losses are reasonably possible but are not currently considered to be probable of occurrence.

We are involved in a number of lawsuits and claims, and we may be involved in future lawsuits and claims, in which substantial monetary damages are sought.

PPG is involved in a number of lawsuits and claims, both actual and potential, in which substantial monetary damages are sought. Those lawsuits and claims relate to contract, patent, environmental, product liability, asbestos exposure, antitrust, employment and other matters arising out of the conduct of PPG’s current and past business activities. Any such claims, whether with or without merit, could be time consuming, expensive to defend and could divert management’s attention and resources. We maintain insurance against some, but not all, of these potential claims, and the levels of insurance we do maintain may not be adequate to fully cover any and all losses. We believe that, in the aggregate, the outcome of all current lawsuits and claims involving PPG, including those described in Note 13, “Commitments and Contingent Liabilities” under Item 8 of this Form 10-K, will not have a material effect on PPG’s consolidated financial position or liquidity; however, such outcome may be material to the results of operations of any particular period in which costs, if any, are recognized. Nonetheless, the results of any future litigation or claims are inherently unpredictable, but such outcomes could have a material adverse effect on our results of operations, cash from operating activities or financial condition.

Fluctuations in foreign currency exchange rates could affect our financial results.

We earn revenues, pay expenses, own assets and incur liabilities in countries using currencies other than the U.S. dollar. Because our consolidated financial statements are presented in U.S. dollars, we must translate revenues and expenses into U.S. dollars at the average exchange rate during each reporting period, as well as assets and liabilities into U.S. dollars at exchange rates in effect at the end of each reporting period. Therefore, increases or decreases in the value of the U.S. dollar against other currencies will affect our net sales, net income and the value of balance sheet items denominated in foreign

currencies. We may use derivative financial instruments to reduce our net exposure to currency exchange rate fluctuations related to foreign currency transactions. However, fluctuations in foreign currency exchange rates, particularly the strengthening of the U.S. dollar against major currencies, could adversely affect our financial condition and results of operations expressed in U.S. dollars. In 2016, this U.S. dollar strengthening had an unfavorable impact on full year net sales and income before income taxes from the translation of foreign earnings into U.S. dollars of approximately $400 million and $70 million, respectively.

We are subject to a variety of complex U.S. and non-U.S. laws and regulations which could increase our compliance costs.

We are subject to a wide variety of complex U.S. and non-U.S. laws and regulations, and legal compliance risks, including securities laws, tax laws, environmental laws, employment and pension-related laws, competition laws, U.S. and foreign export and trading laws, and laws governing improper business practices, including bribery. We are affected by new laws and regulations and changes to existing laws and regulations, including interpretations by courts and regulators. These laws and regulations effectively expand our compliance obligations and potential enforcement actions by governmental authorities or litigation related to them.

New laws and regulations or changes in existing laws or regulations or their interpretation could increase our compliance costs. For example, regulations concerning the composition, use and transport of chemical products continue to evolve. Developments concerning these regulations could potentially impact the availability or viability of some of the raw materials we use in our product formulations and/or our ability to supply certain products to some customers or markets. Import/export regulations also continue to evolve and could result in increased compliance costs, slower product movements or additional complexity in our supply chains.

Our international operations expose us to additional risks and uncertainties that could affect our financial results.

PPG has a significant investment in global operations. This broad geographic footprint serves to lessen the significance of economic impacts occurring in any one region. Notwithstanding the benefits of geographic diversification, our ability to achieve and maintain profitable growth in international markets is subject to risks related to the differing legal, political, social and regulatory requirements and economic conditions of many countries. As a result of our operations outside the U.S., we are subject to certain inherent risks, including political and economic uncertainty, inflation rates, exchange rates, trade protection measures, local labor conditions and laws, restrictions on foreign investments and repatriation of earnings, and weak intellectual property protection. Our percentage of sales generated in 2016 by products sold outside the U.S. was approximately 60%.

Changes in the tax regimes and related government policies and regulations in the countries in which we operate could adversely affect our results and our effective tax rate.

As a multinational corporation, we are subject to various taxes in both the U.S. and non-U.S. jurisdictions. Due to economic and political conditions, tax rates in these various jurisdictions may be subject to significant change. Our future effective income tax rate could be affected by changes in the mix of earnings in countries with differing statutory tax rates, changes in the valuation of deferred tax assets or changes in tax laws or their interpretation. Recent developments, including potential U.S. tax reform discussions, the European Commission's investigations on illegal state aid as well as the Organisation for Economic Co-operation and Development project on Base Erosion and Profit Shifting may result in changes to long-standing tax principles, which could adversely affect our effective tax rate or result in higher cash tax liabilities. If our effective income tax rate was to increase, our cash from operating activities, financial condition and results of operations would be adversely affected.

Although we believe that our tax filing positions are appropriate, the final determination of tax audits or tax disputes may be different from what is reflected in our historical income tax provisions and accruals. If future audits find that additional taxes are due, we may be subject to incremental tax liabilities, possibly including interest and penalties, which could have a material adverse effect on our cash from operating activities, financial condition and results of operations.

Business disruptions could have a negative impact on our results of operations and financial condition.

Unexpected events, including supply disruptions, temporary plant and/or power outages, work stoppages, natural disasters and severe weather events, computer system disruptions, fires, war or terrorist activities, could increase the cost of doing business or otherwise harm the operations of PPG, our customers and our suppliers. It is not possible for us to predict the occurrence or consequence of any such events. However, such events could reduce our ability to supply products, reduce demand for our products or make it difficult or impossible for us to receive raw materials from suppliers or to deliver products to customers.

Failure to successfully integrate acquired businesses into our existing operations could adversely affect our financial results.

Part of the Company's strategy is growth through acquisitions, and we will likely acquire additional businesses and enter into additional joint ventures in the future. Growth through acquisitions and the formation of joint ventures involve risks, including:

- difficulties in assimilating acquired companies and products into our existing business;
- delays in realizing the benefits from the acquired companies or products;
- diversion of our management's time and attention from other business concerns;
- difficulties due to lack of or limited prior experience in any new markets we may enter;
- unforeseen claims and liabilities, including unexpected environmental exposures or product liability;
- unexpected losses of customers or suppliers of the acquired or existing business;
- difficulty in conforming the acquired business' standards, processes, procedures and controls to those of our operations; and
- difficulties in retaining key employees of the acquired businesses.

Our failure to address these risks or other problems encountered in connection with our past or future acquisitions and joint ventures could cause us to fail to realize the anticipated benefits of such acquisitions or joint ventures and could adversely affect our results of operations, cash from operating activities or financial condition.

Our ability to understand our customers' specific preferences and requirements, and to innovate, develop, produce and market products that meet customer demand is critical to our business results.

Our business relies on continued global demand for our brands and products. To achieve business goals, we must develop and sell products that appeal to customers. This is dependent on a number of factors, including our ability to produce products that meet the quality, performance and price expectations of our customers and our ability to develop effective sales, advertising and marketing programs.

We believe the automotive industry will experience significant and continued change in the coming years. Vehicle manufacturers continue to develop new safety features such as collision avoidance technology and self-driving vehicles that may reduce vehicle collisions in the future, potentially lowering demand for our refinish coatings. In addition, through the introduction of new technologies, new business models or new methods of travel, such as ridesharing, the number of automotive OEM new-builds may decline, potentially reducing demand for our automotive OEM coatings.

Our future growth will depend on our ability to continue to innovate our existing products and to develop and introduce new products. If we fail to keep pace with product innovation on a competitive basis or to predict market demands for our products, our businesses, financial condition and results of operations could be adversely affected.

The industries in which we operate are highly competitive.

With each of our businesses, an increase in competition may cause us to lose market share, lose a large regional or global customer, or compel us to reduce prices to remain competitive, which could result in reduced margins for our products. Competitive pressures may not only reduce our margins but may also impact our revenues and our growth which could adversely affect our results of operations.

The security of our information technology systems could be compromised, which could adversely affect our ability to operate.

Increased global information technology security requirements, threats and sophisticated and targeted computer crime pose a risk to the security of our systems, networks and the confidentiality, availability and integrity of our data. Despite our efforts to protect sensitive information and confidential and personal data, our facilities and systems may be vulnerable to security breaches. This could lead to negative publicity, theft, modification or destruction of proprietary information or key information, manufacture of defective products, production downtimes and operational disruptions, which could adversely affect our reputation, competitiveness and results of operations.

Item 1B. Unresolved Staff Comments
None.

Item 2. Properties
The Company’s corporate headquarters is located in Pittsburgh, Pa. The Company’s manufacturing facilities, sales offices, research and development centers and distribution centers are located throughout the world. As of February 16, 2017, the Company operated 140 manufacturing facilities in 40 countries, and the principal manufacturing and distribution facilities were as follows:

Performance Coatings:	Amsterdam, Netherlands; Birstall, United Kingdom; Budapest, Hungary; Clayton, Australia; Delaware, Ohio; Dover, Del.; Gonfreville, France; Huntsville, Ala.; Huron, Ohio; Kunshan, China; Little Rock, Ark.; Milan, Italy; Mojave, Calif.; Moreuil, France; Shildon, United Kingdom; Sylmar, Calif.; Soborg, Denmark; Stowmarket, United Kingdom; and Wroclaw, Poland.
Industrial Coatings:	Barberton, Ohio; Busan, South Korea; Cieszyn, Poland; Cleveland, Ohio; Lake Charles, La.; Oak Creek, Wis.; Quattordio, Italy; San Juan del Rio, Mexico; Sumaré, Brazil; Tianjin, China, and Zhangjiagang, China
Glass:	Chester, N.C.; Lexington, N.C.; and Shelby, N.C.

Including the principal manufacturing facilities noted above, the Company has manufacturing facilities in the following geographic areas:

United States:	39 manufacturing facilities in 19 states.
Other Americas:	18 manufacturing facilities in 5 countries.
EMEA:	56 manufacturing facilities in 25 countries.
Asia:	27 manufacturing facilities in 9 countries.

The Company’s principal research and development centers are located in Allison Park, Pa.; Cheswick, Pa.; Monroeville, Pa.; Shelby, N.C.; Burbank, Calif. and Tepexpan, Mexico.
The Company’s headquarters, certain distribution centers and substantially all company-owned paint stores are located in facilities that are leased while the Company’s other facilities are generally owned. Our facilities are considered to be suitable and adequate for the purposes for which they are intended and overall have sufficient capacity to conduct business in the upcoming year.

Item 3. Legal Proceedings

PPG is involved in a number of lawsuits and claims, both actual and potential, including some that it has asserted against others, in which substantial monetary damages are sought. These lawsuits and claims may relate to contract, patent, environmental, product liability, asbestos exposure, antitrust, employment and other matters arising out of the conduct of PPG's current and past business activities. To the extent that these lawsuits and claims involve personal injury and property damage, PPG believes it has adequate insurance; however, certain of PPG's insurers are contesting coverage with respect to some of these claims, and other insurers may contest coverage. PPG's lawsuits and claims against others include claims against insurers and other third parties with respect to actual and contingent losses related to environmental, asbestos and other matters.

The results of any future litigation and claims are inherently unpredictable. However, management believes that, in the aggregate, the outcome of all lawsuits and claims involving PPG, including asbestos-related claims, will not have a material effect on PPG's consolidated financial position or liquidity; however, such outcome may be material to the results of operations of any particular period in which costs, if any, are recognized.

For many years, PPG has been a defendant in lawsuits involving claims alleging personal injury from exposure to asbestos. For a description of asbestos litigation affecting the Company, see Note 13, "Commitments and Contingent Liabilities" under Item 8 of this Form 10-K.

In the past, the Company and others have been named as defendants in several cases in various jurisdictions claiming damages related to exposure to lead and remediation of lead-based coatings applications. PPG has been dismissed as a defendant from most of these lawsuits and has never been found liable in any of these cases.

In March 2016, the Natural Resource Trustees for the Calcasieu River Estuary (the United States Department of the Interior, acting through the United States Fish and Wildlife Service, the National Oceanic and Atmospheric Administration of the United States Department of Commerce, the Louisiana Department of Environmental Quality and the Louisiana Department of Wildlife and Fisheries) reached an agreement in principle with PPG and two other potentially responsible parties to resolve the Trustees' claims for natural resource damages alleged to have been caused by the release of hazardous substances into the Estuary. PPG's share of this settlement is $3,600,000.

In December 2011, the United States Environmental Protection Agency ("EPA") issued a Finding of Violation alleging that PPG's Delaware, Ohio facility violated certain leak detection and repair ("LDAR") requirements of the federal Clean Air Act. In 2016, PPG and the EPA reached an agreement in principle to settle this matter with a total civil penalty of $225,000 and certain enhancements to the facility's LDAR program. PPG and the EPA are in the process of finalizing the terms of a Consent Decree for this matter which will memorialize the terms of this settlement.

Executive Officers of the Company

Set forth below is information related to the Company's executive officers as of February 16, 2017.

Name	Age	Title
Michael H. McGarry [(a)]	58	Chairman and Chief Executive Officer since September 2016
Viktoras R. Sekmakas [(b)]	56	Executive Vice President since September 2012
Frank S. Sklarsky [(c)]	60	Executive Vice President and Chief Financial Officer since August 2013
Glenn E. Bost II [(d)]	64	Senior Vice President and General Counsel since July 2010
Jean-Marie Greindl [(e)]	54	Senior Vice President, Architectural Coatings and President PPG EMEA since March 2016
Timothy M. Knavish [(f)]	51	Senior Vice President, Automotive Coatings since March 2016
Ramaparasad Vadlamannati [(g)]	54	Senior Vice President, Protective and Marine Coatings since March 2016
Vincent J. Morales [(h)]	51	Senior Vice President and Chief Financial Officer effective March 1, 2017

(a) Mr. McGarry served as President and Chief Executive Officer from September 2015 through August 2016, President and Chief Operating Officer from March 2015 through August 2015; Chief Operating Officer from August 2014 through February 2015; Executive Vice President from September 2012 through July 2014; and Senior Vice President, Commodity Chemicals from July 2008 through August 2012.

(b) Mr. Sekmakas served as Senior Vice President, Industrial Coatings and President, Europe from September 2011 through August 2012; Senior Vice President, Industrial Coatings and President, Asia Pacific Coatings from August

2010 through August 2011; and Vice President Industrial Coatings and President, Asia Pacific Coatings from March 2010 through July 2010.

(c) Mr. Sklarsky was appointed Executive Vice President, Finance, in April 2013 when he joined PPG. Prior to joining PPG, Mr. Sklarsky was Executive Vice President and Chief Financial Officer of Tyco International, Ltd. from December 2010 through September 2012. Mr. Sklarsky has announced his intention to retire effective March 1, 2017.

(d) Mr. Bost served as Vice President and Associate General Counsel from July 2006 through June 2010.

(e) Mr. Greindl served as Vice President, Automotive Coatings, EMEA and President, PPG EMEA from February 2013 through February 2016, Vice President, Automotive Coatings, EMEA from January 2011 through January 2013 and Vice President, Automotive Coatings, Europe from October 2010 through December 2010.

(f) Mr. Knavish served as Vice President, Protective and Marine Coatings from August 2012 through February 2016 and Vice President, Automotive Coatings, Americas from March 2010 through July 2012.

(g) Mr. Vadlamannati served as Vice President, Architectural Coatings, EMEA and Asia/Pacific from August 2014 through February 2016, Vice President, Architectural Coatings, EMEA from February 2012 through July 2014, Vice President, Architectural Coatings, EMEA for Region Western Europe from March 2011 through January 2012 and Vice President, Automotive Refinish, EMEA from September 2010 through February 2011.

(h) Mr. Morales will become Senior Vice President and Chief Financial Officer on March 1, 2017 upon Mr. Sklarsky's retirement. Since June 2016, he served as Vice President, Finance. From June 2015 to June 2016, he served as Vice President Investor Relations and Treasurer and Vice President, Investor Relations from October 2007 to June 2015.

Item 4. Mine Safety Disclosures

Not Applicable.

Part II

Item 5. Market for the Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

The information required by Item 5 regarding market information, including stock exchange listings and quarterly stock market prices, dividends and holders of common stock is included in Exhibit 13.1 filed with this Form 10-K and is incorporated herein by reference. This information is also included in the PPG Shareholder Information on page 5 of the Annual Report to shareholders.

Directors who are not also officers of the Company receive common stock equivalents pursuant to the PPG Industries, Inc. Deferred Compensation Plan for Directors ("PPG Deferred Compensation Plan for Directors"). Common stock equivalents are hypothetical shares of common stock having a value on any given date equal to the value of a share of common stock. Common stock equivalents earn dividend equivalents that are converted into additional common stock equivalents but carry no voting rights or other rights afforded to a holder of common stock. The common stock equivalents credited to directors under this plan are exempt from registration under Section 4(a)(2) of the Securities Act of 1933 as private offerings made only to directors of the Company in accordance with the provisions of the plan. Under the PPG Deferred Compensation Plan for Directors, each director may elect to defer the receipt of all or any portion of the compensation paid to such director for serving as a PPG director. All deferred payments are held in the form of common stock equivalents. Payments out of the deferred accounts are made in the form of common stock of the Company (and cash as to any fractional common stock equivalent). The directors, as a group, were credited with 17,807; 15,445; and 25,724 common stock equivalents in 2016, 2015 and 2014, respectively, under this plan. The values of the common stock equivalents, when credited, ranged from $95.63 to $116.07 in 2016, $90.13 to $98.73 in 2015, and $95.59 to $109.91 in 2014.

Issuer Purchases of Equity Securities - Fourth Quarter, 2016

Month	Total Number of Shares Purchased	Avg. Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Programs	Max. Number of Shares That May Yet Be Purchased Under the Programs[(1),(2)]
October 2016				
Repurchase program	1,043,300	$92.71	1,043,300	26,019,358
November 2016				
Repurchase program	2,893,131	$95.70	2,893,131	22,373,733
December 2016				
Repurchase program	2,876,564	$96.20	2,876,564	19,729,601
Total quarter ended December 31, 2016				
Repurchase program	6,812,995	$95.45	6,812,995	19,729,601

(1) In April 2014, PPG's board of directors authorized a $2 billion repurchase program which was completed during the fourth quarter 2016.

(2) In October 2016, PPG's board of directors approved a $2 billion share repurchase program. The remaining shares yet to be purchased under the 2016 program have been calculated using PPG's closing stock price on the last business day of the respective month. This repurchase program has no expiration date.

No shares were withheld in satisfaction of the exercise price and/or tax withholding obligation by holders of employee stock options who exercised options granted under the Company's equity compensation plans in the fourth quarter of 2016.

Item 6. Selected Financial Data

The information required by Item 6 regarding the selected financial data for the five years ended December 31, 2016 is included in Exhibit 13.2 filed with this Form 10-K and is incorporated herein by reference. This information is also reported in the Five-Year Digest on page 86 of the Annual Report to shareholders.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations
Executive Overview
Below are our key financial results from continuing operations for the fiscal year ended December 31, 2016:

- Net sales were $14.8 billion, consistent with the prior year, despite unfavorable foreign currency translation (3%).
- Cost of sales, exclusive of depreciation and amortization decreased 2% to $8.1 billion, including the effects of foreign currency translation.
- Selling, general and administrative expenses increased 1% to $3.7 billion, inclusive of a $46 million pension settlement charge associated with the sale of the European fiber glass business.
- In December 2016, PPG approved a business restructuring program and recorded a $197 million charge consisting of approximately $140 million of severance and other cash charges and nearly $60 million of asset write-downs and other non-cash charges. The actions have anticipated annual savings of approximately $125 million once fully implemented.
- Income before income taxes was $827 million.
- The effective tax rate for 2016 was 29.1%.
- Net income from continuing operations was $564 million and earnings per diluted share was $2.11.
- Cash and short-term investments were approximately $1.9 billion at year-end.
- Cash from operating activities - continuing operations was $1.2 billion, net of $630 million (after-tax) paid to fund the Pittsburgh Corning asbestos trust (the "Trust").
- Capital expenditures for modernization and other improvements, was $402 million.
- Cash used for business acquisitions (net of cash acquired), was $349 million.
- In April 2016, the Company raised the per-share dividend by 11%. In 2016, the Company paid approximately $415 million in dividends and also repurchased $1.05 billion of its outstanding common stock.
- The Company achieved the top-end of its cash deployment target for acquisitions and share repurchases, deploying $2.5 billion in 2015 and 2016 combined.
- The Company announced a new cash deployment target for acquisitions and share repurchases for 2017 and 2018 combined of $2.5 billion to $3.5 billion.

Performance Overview
Net Sales

($ in millions, except percentages)	December 31, 2016	2015	2014	% Change 2016 vs. 2015	2015 vs. 2014
United States and Canada	$6,595	$6,589	$6,624	0.1 %	(0.5)%
Europe, Middle East and Africa (EMEA)	4,304	4,270	4,802	0.8 %	(11.1)%
Asia Pacific	2,431	2,434	2,517	(0.1)%	(3.3)%
Latin America	$1,421	$1,473	$848	(3.5)%	73.7 %
Total	$14,751	$14,766	$14,791	(0.1)%	(0.2)%

2016 vs. 2015
Net sales decreased $15 million due to the following:
Unfavorable foreign currency translation (3%)
Partially offset by:
Net sales from acquired businesses (+2%)
Higher sales volumes (+1%)
Unfavorable foreign currency translation reduced net sales by approximately $400 million as the U.S. dollar strengthened against most foreign currencies year-over-year, notably the British pound, the Mexican peso, and the Chinese yuan.
Acquired businesses added approximately $275 million of sales in 2016, primarily due to the partial year sales from businesses acquired in 2015, including Revocoat, IVC Industrial Coatings, Le Joint Francais and Cuming Microwave,

as well as the 2016 acquisitions of MetoKote and Univer.
Sales volume growth, excluding acquisition related sales, grew 1% led by growth in Asia Pacific and EMEA, while U.S. and Canada sales volumes as a percentage of sales, declined modestly.
2015 vs. 2014
Net sales decreased $25 million due to the following:
Unfavorable foreign currency translation (7%)
Partially offset by:
Net sales from acquired businesses (+6%)
Higher sales volumes (+1%)
Foreign currency translation unfavorably impacted net sales by $1.1 billion as the U.S. dollar strengthened against most foreign currencies versus the prior year.
Acquired businesses added $941 million of sales in 2015, primarily Consorcio Comex S.A. de C.V. (“Comex”), supplemented by several other smaller acquisitions made in 2014 and 2015. In November 2015, Comex reached its one year anniversary and its net sales and income are reported as organic growth subsequent to its anniversary date.
Sales volume growth occurred primarily in the emerging regions and EMEA, while North America sales volumes declined approximately 1%.

Cost of sales, exclusive of depreciation and amortization

($ in millions, except percentages)	December 31, 2016	2015	2014	% Change 2016 vs. 2015	2015 vs. 2014
Cost of sales, exclusive of depreciation and amortization	$8,063	$8,206	$8,348	(1.7)%	(1.7)%
Cost of sales as a % of net sales	54.7%	55.6%	56.4%	(0.9)%	(0.8)%

2016 vs. 2015

Cost of sales, exclusive of depreciation and amortization, decreased $143 million (2%) due to the following:

- Foreign currency translation
- Lower manufacturing costs

Partially offset by:

- Cost of sales from acquired businesses
- Higher sales volumes

2015 vs. 2014

Cost of sales, exclusive of depreciation and amortization, decreased $142 million (2%) due to the following:

- Foreign currency translation
- Lower manufacturing costs

Partially offset by:

- Cost of sales from acquired businesses
- Higher sales volumes

Selling, general and administrative expenses

($ in millions, except percentages)	December 31, 2016	2015	2014	% Change 2016 vs. 2015	2015 vs. 2014
Selling, general and administrative expenses	$3,662	$3,624	$3,696	1.0%	(1.9)%
Selling, general and administrative expenses as a % of net sales	24.8%	24.5%	25.0%	0.3%	(0.5)%

2016 vs. 2015

Selling, general and administrative expenses increased $38 million (+1%) primarily due to:

- Pension settlement charge of $46 million associated with the divestiture of the European fiber glass business
- Selling, general and administrative expenses from acquired businesses
- Overhead cost inflation

Partially offset by:

- Foreign currency translation
- Restructuring cost savings

2015 vs. 2014

Selling, general and administrative expenses decreased $73 million (2%) due to the following:

- Foreign currency translation
- Restructuring cost savings

Partially offset by:

- Selling, general and administrative expenses from acquired businesses
- Overhead cost inflation

Other costs and income

($ in millions, except percentages)	December 31, 2016	2015	2014	% Change 2016 vs. 2015	2015 vs. 2014
Interest expense, net of Interest income	$99	$86	$137	15.1%	(37.2)%

Business restructuring	$197	$140	$—	40.7%	NA
Debt refinancing charge	$—	$—	$317	— %	NA
Pension settlement charges	$968	$—	$—	NA	NA
Other charges	$178	$93	$217	91.4%	(57.1)%
Other income	$(176)	$(125)	$(215)	40.8%	(41.9)%

Interest expense, net of Interest income

Interest expense, net of Interest income increased $13 million in 2016 versus 2015 as interest income decreased year-over-year due to lower interest rates and lower average cash deposits on hand. Interest expense, net of Interest income decreased $51 million in 2015 versus the prior year primarily due to a debt refinancing undertaken in the fourth quarter of 2014.

Business restructuring

In December 2016, PPG's Board of Directors approved a business restructuring program which includes actions necessary to reduce its global cost structure. The program is focused on certain regions and end-use markets where business conditions are the weakest, as well as reductions in production capacity and various global functional and administrative costs. A pre-tax restructuring charge of $197 million was recorded in December 2016, of which about $140 million represents employee severance and other cash costs and nearly $60 million is related to the write-down of certain assets held for sale and other non-cash costs. In addition to the aforementioned pre-tax charge and cash costs, approximately $15 million of incremental restructuring-related cash costs are expected during 2017 for certain items that are required to be expensed on an as-incurred basis. The restructuring actions will result in the net reduction of approximately 1,700 positions, with substantially all actions to be complete by the first quarter 2018. The actions have anticipated annual savings of approximately $125 million once fully implemented. Refer to Note 7, "Business Restructuring" in Item 8 of this Form 10-K for additional information.

In 2015, PPG recorded a pre-tax restructuring charge of $140 million, of which about 85% represents employee severance and other cash charges. PPG expects these restructuring actions will result in full year, pre-tax savings of approximately $105 million in 2017. As of December 31, 2016, substantially all actions have been completed.

Debt refinancing charge

In 2014, the Company recorded a pre-tax charge of $317 million representing costs related to a debt refinancing undertaken to lower the Company's future interest costs. Refer to Note 8, "Borrowings and Lines of Credit" in Item 8 of this Form 10-K for additional information.

Pension settlement charges

During 2016, PPG permanently transferred approximately $1.8 billion of its U.S. and Canadian pension obligations and assets to several highly rated insurance companies. These actions triggered remeasurement and partial settlement of certain of the Company’s defined benefit pension plans. PPG recognized a $968 million pre-tax settlement charge in connection with these transactions. Refer to Note 12, "Employee Benefit Plans" in Item 8 of this Form 10-K for additional information.

Other charges

Other charges in 2016 were higher than in 2015 and Other charges in 2015 were lower than in 2014, due to pre-tax environmental charges of $82 million in 2016 and $138 million in 2014. These charges were principally for environmental remediation at a former chromium manufacturing plant and associated sites in New Jersey.

Other income

Other income in 2016 was higher than in 2015 due to gains totaling $82 million resulting from the sale of PPG’s ownership interests in two Asian fiber glass joint ventures, a legacy U.S. automotive glass and services business and a U.S. business affiliate. Other income in 2015 was lower than 2014 due to a $94 million pre-tax gain representing PPG's share of the gain recognized from the sale of an equity affiliate's business in 2014.

Effective tax rate and earnings per diluted share, continuing operations

	December 31,			% Change	
($ in millions, except percentages)	2016	2015	2014	2016 vs. 2015	2015 vs. 2014
Income tax expense	$241	$424	$237	(43.2)%	78.9%
Effective tax rate	29.1 %	23.8 %	17.6 %	5.3 %	6.2 %
Adjusted effective tax rate*	24.5 %	24.1 %	23.8 %	0.4 %	0.3 %
Earnings per diluted share	$2.11	$4.89	$3.88	(56.9)%	26.0%
Adjusted earnings per diluted share*	$5.82	$5.43	$4.75	7.2 %	14.3%

*See the Regulation G reconciliations - results of operations

The effective tax rate for the year-ended December 31, 2016 was 29.1% and increased 5.3% from the prior year primarily due to the inclusion of the tax effects of significant transactions during the year, including the tax effects of funding the Pittsburgh Corning asbestos trust.

As reported, earnings per diluted share from continuing operations for the year ended December 31, 2016 declined year-over-year from 2015, primarily due to significant pension settlement charges and other charges for items that cannot reasonably be expected to recur or that are not attributable to our primary operations. Refer to the Regulation G Reconciliations - Results of Operations for additional information. The Company’s earnings per diluted share and adjusted earnings per diluted share both benefited from the 10.7 million, 7.0 million and 7.6 million shares of stock repurchased in 2016, 2015 and 2014, respectively.

Regulation G Reconciliations - Results of Operations

PPG Industries believes investors' understanding of the company's operating performance is enhanced by the disclosure of net income, earnings per diluted share and the effective tax rate adjusted for certain charges. PPG's management considers this information useful in providing insight into the company's ongoing operating performance because it excludes the impact of items that cannot reasonably be expected to recur on a quarterly basis or that are not attributable to our primary operations. Net income and earnings per diluted share adjusted for these items are not recognized financial measures determined in accordance with U.S. generally accepted accounting principles (GAAP) and should not be considered a substitute for net income or earnings per diluted share or other financial measures as computed in accordance with U.S. GAAP. In addition, adjusted net income, earnings per diluted share and the effective tax rate may not be comparable to similarly titled measures as reported by other companies.

Income before income taxes is reconciled to adjusted income before income taxes, the effective tax rate from continuing operations is reconciled to the adjusted effective tax rate from continuing operations and net income (attributable to PPG) and earnings per share – assuming dilution (attributable to PPG) are reconciled to adjusted net income (attributable to PPG) and adjusted earnings per share – assuming dilution below:

Year-ended December 31, 2016

($ in millions, except percentages and per share amounts)	Income Before Income Taxes	Tax Expense	Effective Tax Rate	Net income from continuing operations (attributable to PPG)	Earnings per diluted share
As reported, continuing operations	$827	$ 241	29.1 %	$ 564	$ 2.11
Includes:					
Charges related to transaction-related costs(1)	9	3	37.6 %	6	0.03
Charges related to pension settlements	968	352	36.4 %	616	2.31
Charge related to business restructuring	197	51	25.8 %	146	0.55
Charge related to environmental remediation	82	31	37.6 %	51	0.20
Loss on divestiture of European fiber glass business	42	(2)	(4.8)%	44	0.17
Net gain on disposals of ownership interests in business affiliates	(82)	(27)	32.9 %	(55)	(0.21)
Net tax effect of asbestos settlement funding	—	(151)	N/A	151	0.57
Charge related to early retirement of debt	8	3	37.6 %	5	0.02
Charges related to asset write-downs	27	8	29.6 %	20	0.07
Adjusted, continuing operations, excluding certain charges	$2,078	$ 509	24.5 %	$ 1,548	$ 5.82

Year-ended December 31, 2015

($ in millions, except percentages and per share amounts)	Income Before Income Taxes	Tax Expense	Effective Tax Rate	Net income from continuing operations (attributable to PPG)	Earnings per diluted share
As reported, continuing operations	$1,783	$ 424	23.8 %	$ 1,338	$ 4.89
Includes:					
Charge related to business restructuring	140	34	24.3 %	106	0.39
Charges related to transaction-related costs(1)	44	14	33.3 %	30	0.10
Charge related to pension settlement	7	2	28.6 %	5	0.02
Charge related to equity affiliate debt refinancing	11	4	37.6 %	7	0.03
Adjusted, continuing operations, excluding certain charges	$1,985	$ 478	24.1 %	$ 1,486	$ 5.43

Year-ended December 31, 2014

($ in millions, except percentages and per share amounts)	Income Before	Tax Expense	Effective Tax Rate	Net income from	Earnings per

	Income Taxes			continuing operations (attributable to PPG)	diluted share
As reported, continuing operations	$1,346	$ 237	17.6 %	$ 1,085	$ 3.88
Includes:					
Charge related to debt refinancing	317	117	36.9 %	200	0.72
Charges related to environmental remediation	138	52	37.7 %	86	0.30
Charges related to transaction-related costs(1)	61	20	32.8 %	41	0.15
Gain on asset dispositions	(94)	(35)	37.2 %	(59)	(0.21)
Charge related to pension settlement	7	2	28.6 %	5	0.02
Benefit from favorable foreign tax ruling	—	29	N/A	(29)	(0.11)
Adjusted, continuing operations, excluding certain charges	$1,775	$ 422	23.8 %	$ 1,329	$ 4.75

(1) Transaction-related costs include advisory, legal, accounting, valuation, and other professional or consulting fees incurred to effect significant acquisitions, as well as similar fees and other costs to effect divestitures not classified as discontinued operations. These costs also include the flow-through cost of sales impact for the step up to fair value of inventory acquired in acquisitions. These costs also include certain nonrecurring severance costs and charges associated with the Company’s business portfolio transformation.

Performance of Reportable Business Segments

Performance Coatings

($ in millions, except percentages)	December 31, 2016	2015	2014	$ Change 2016 vs. 2015	$ Change 2015 vs. 2014	% Change 2016 vs. 2015	% Change 2015 vs. 2014
Net sales	$8,580	$8,765	$8,698	$(185)	$ 67	(2.1)%	0.8%
Segment income	$1,314	$1,302	$1,205	$12	$ 97	0.9 %	8.0%

2016 vs. 2015

Performance Coatings net sales decreased (2%) due to the following:

- Unfavorable foreign currency translation of approximately $260 million (3%)

Partially offset by:

- Net sales from acquisitions (+1%)

Architectural coatings - EMEA sales volumes were flat year-over-year. Growth in western Europe was offset by reduced demand levels in central Europe and in Africa, where economies are closely linked to depressed commodity prices. Acquisition-related sales from Univer in Italy added about $10 million in the fourth quarter 2016.

Protective and marine coatings net sales volumes declined a low-to-mid-single-digit-percentage year-over-year as growth in protective coatings was offset by declines in marine coatings, primarily due to lower shipbuilding activity in Asia Pacific and the ongoing impact of decreased capital investment and maintenance in the oil and gas sector. Protective coatings sales volumes grew versus the prior year, led by the U.S. and Canada and Latin America regions, including benefits from expanded distribution through the PPG-Comex concessionaire network.

Aerospace coatings sales volumes increased modestly year-over-year, in line with industry growth rates. Sales growth occurred in all major regions.

Automotive refinish coatings organic sales grew at a low-single-digit percentage rate year-over-year, outperforming end-use market demand levels in the U.S. and Canada and Asia Pacific, as customers continue to adopt PPG's industry leading technologies.

Architectural coatings - Americas and Asia Pacific organic sales were flat versus the prior year. In the U.S. and Canada, sales volumes advanced in the company-owned store channel versus the prior year, mainly due to recent growth-related investments and initiatives. The increase in the company-owned stores channel was more than offset by sales volume declines in national retail (DIY) accounts and U.S. independent dealer channel year-over-year, despite DIY channel strengthening in the second half of 2016. Latin America organic sales were up year-over-year, led by Mexico which grew at more than double the Mexican GDP growth rate.

Segment income increased $12 million (+1%) primarily due to the benefits from prior year business restructuring initiatives, modestly higher selling prices, lower manufacturing costs, acquisition-related income (Cumings Microwave, Le Joint Francais, Univer), partially offset by unfavorable foreign currency translation and higher growth-related spending in the U.S. architectural coatings business. Segment income margins expanded, increasing 40 basis points year-over-year.

2015 vs. 2014

Performance Coatings net sales increased (1%) due to the following:

- Net sales from acquisitions (+9%), largely Comex
- Modestly higher selling prices

Partially offset by:

- Unfavorable foreign currency translation of approximately $700 million (8%)
- Lower sales volumes (1%)

Architectural coatings - EMEA sales volumes declined 1%. Demand was inconsistent throughout the region with modest growth continuing in certain countries, including the U.K., while several other countries experienced lower demand, including France.

Protective and marine coatings net sales volumes were slightly higher year-over-year. Sales for the business increased due to acquisition-related sales synergies from the Comex acquisition offset by unfavorable foreign currency translation.

Organic sales growth continued in aerospace coatings, aided by increased end-use market demand, but moderated versus the prior period reflecting the strong growth the business has delivered over the past several years. Automotive refinish coatings sales volume growth was higher, with solid growth trends in the U.S. and Canada.

Excluding the impacts of acquisitions and currency, architectural coatings - Americas and Asia Pacific net sales were lower versus 2014. The year-over-year sales comparison was negatively impacted in the U.S. and Canada by several new PPG product pipeline fills at major customers in the previous year, as well as customer inventory management by most U.S. and Canadian retail customers and independent dealers at the end of a modest paint season. Organic sales growth in the acquired Comex architectural coatings business was a high-single-digit percentage, but was partially mitigated by unfavorable foreign currency translation caused by the impact of a weaker Mexican peso versus the U.S. dollar.

Segment income increased $97 million (+8%) primarily due to acquisition-related income, lower manufacturing costs and modestly higher selling prices, partially offset by unfavorable foreign currency translation and lower sales volumes.

Looking Ahead

In the first quarter of 2017, we expect year-over-year growth in our automotive refinish business as customers continue to adopt PPG’s industry-leading technologies in most major regions. We expect aerospace coatings sales volume growth to be modest, as overall industry demand remains tepid. Architectural coatings - EMEA sales volume growth is expected to improve modestly in the first quarter 2017, with results remaining uneven by country. Architectural coatings - Americas and Asia Pacific sales volumes are seasonally-lower in the first quarter; however, PPG expects overall volume trends by customer channel to be consistent with the fourth quarter 2016. The protective and marine coatings business is expected to continue to experience sales volumes declines in aggregate for the first quarter 2017 as weakness in marine shipbuilding is expected to continue and is likely to more than offset protective coatings gains. Looking ahead, acquisition-related sales are expected to add approximately $10 million to segment net sales in first quarter 2017. Additionally, based on mid-January exchange rates, we expect foreign currency translation on segment net sales and income to be a similar headwind as experienced in the fourth quarter 2016.

Industrial Coatings

($ in millions, except percentages)	December 31, 2016	2015	2014	$ Change 2016 vs. 2015	$ Change 2015 vs. 2014	% Change 2016 vs. 2015	% Change 2015 vs. 2014
Net sales	$5,690	$5,476	$5,552	$214	$(76)	3.9%	(1.4)%
Segment income	$1,042	$985	$951	$57	$34	5.8%	3.6 %

2016 vs. 2015

Industrial Coatings segment net sales increased (4%) due to the following:

- Net sales from acquired businesses (+4%)
- Higher sales volumes (+3%)

Partially offset by:

- Unfavorable foreign currency translation of approximately $125 million (2%)
- Lower selling prices (1%)

PPG’s automotive OEM coatings business sales volumes increased a low-single-digit-percentage over the prior year, consistent with modest global automotive industry production growth. PPG's sales volumes differed by region, led by year-over-year growth in Europe and Asia Pacific, while U.S. and Canada sales volumes declined.

General industrial coatings and specialty coatings and materials sales volumes, in aggregate, increased a mid-single-digit percentage year-over-year, marking four consecutive quarters of above-market growth. Sales volume growth was led by Asia Pacific and EMEA, and was driven by strong end-market demand for automotive components, electronic materials, coil and extrusion products. Latin America sales volumes advanced moderately, while volumes in the U.S. and Canada declined modestly.

Packaging coatings sales volumes were up a mid-to-high single-digit percentage year-over-year, primarily driven by continued strong sales growth momentum related to the adoption of PPG's new can coatings technologies. This above market sales volume growth was led by U.S. and Canada and Asia Pacific regions.

Segment income increased $57 million (+6%) primarily due to lower manufacturing costs, higher sales volumes, acquisition-related income (MetoKote, IVC Industrial Coatings, Revocoat) and the benefits from prior year restructuring initiatives, partially offset by unfavorable foreign currency translation and modestly lower selling prices. Late in 2016, PPG experienced higher transportation and logistics costs required to meet increasing customer demand levels in Asia Pacific. Segment income margins continued to improve, increasing 30 basis points year-over-year.

2015 vs. 2014

Industrial Coatings segment net sales decreased (1%) due to the following:

- Unfavorable foreign currency translation of nearly $400 million (7%)
- Lower selling prices (1%)

Partially offset by:

- Net sales from acquired businesses (+4%)
- Higher sales volumes (+3%), with growth in all regions, led by Asia Pacific and EMEA

PPG's automotive OEM coatings business achieved sales volume growth in all regions, with an aggregate business unit growth rate of a high-mid-single-digit percentage year-over-year in comparison with the global auto industry production growth rate of approximately 2%. PPG sales volume growth was led by strong European and Asian demand. PPG continued to benefit from the adoption of new technologies and ongoing focus on customer service and customer process improvement initiatives.

Sales volumes declined modestly in PPG's general industrial coatings and specialty coatings and materials businesses in comparison to strong volume growth in the prior year period. Demand was mixed across various end-use markets and regions.

Packaging coatings sales volumes were up a high-mid-single-digit percentage, aided by new product introductions and continued emerging region growth.

Segment income increased $34 million (+4%) primarily due to lower manufacturing costs, higher sales volumes and acquisition-related income, partially offset by unfavorable foreign currency translation.

Looking ahead

In the first quarter of 2017, we expect low-single-digit global automotive industry growth led by Europe and Mexico, with continued declines in the U.S. and Canada. We expect moderate general industrial demand growth trends to continue in aggregate but to remain mixed by geography and end-use market. We anticipate sales volume growth to continue in packaging coatings due to the ongoing industry conversion to BPA non-intent interior can coatings. Additionally, we expect the increased transportation and logistic costs experienced during the fourth quarter 2016 to meet increasing customer demand levels in Asia Pacific to continue during the first quarter 2017. Looking ahead, we anticipate MetoKote acquisition-related sales to add approximately $50 million in the first quarter 2017. Additionally, based on mid-January exchange rates, we expect foreign currency translation on segment net sales and income to be a similar headwind as experienced in the fourth quarter 2016.

Glass

($ in millions, except percentages)	December 31, 2016	2015	2014	$ Change 2016 vs. 2015	2015 vs. 2014	% Change 2016 vs. 2015	2015 vs. 2014
Net sales	$481	$525	$541	$(44)	$(16)	(8.4)%	(3.0)%
Segment income	$53	$38	$35	$15	$3	39.5 %	8.6 %

2016 vs. 2015

Glass segment net sales decreased (8%) due to the following:

- Absence of net sales from divested business (7%)
- Unfavorable foreign currency translation of approximately $5 million (1%)

Fiber glass sales volumes were flat as weaker U.S. volumes were offset by stronger European volumes. The October 1, 2016 sale of the European fiber glass business negatively impacted net sales by approximately 7%.

Segment income increased $15 million (+39%) primarily due to improved manufacturing performance and strong cost-management efforts, including business restructuring benefits, and despite the absence of fourth quarter 2016 income related to the divested European fiber glass business and Asia fiber glass joint ventures.

2015 vs. 2014

Glass segment net sales decreased (3%) due to the following:

- Unfavorable foreign currency translation (5%)

Partially offset by:

- Higher selling prices (+1%)
- Higher sales volumes (+1%)

Fiber glass sales volumes increased a low-single-digit percentage in the U.S. market. Selling prices improved modestly year-over-year in the U.S. and Europe.

Segment income increased $3 million (+9%) due to higher selling prices and higher volumes and despite the impact of unfavorable foreign currency translation. Segment income was also unfavorably impacted by higher pension costs.

Looking ahead

In the first quarter of 2017, we expect a similar industry demand environment and consistent PPG sales sequentially due to normal business seasonality. Year-over-year comparisons in 2017 will continue to reflect the absence of sales and income from the divested European fiber glass business and two Asian fiber glass joint ventures until their one-year anniversaries in the fourth quarter 2017. We do not anticipate any significant impact from foreign currency translation.

Review and Outlook

During 2016, economic conditions remained mixed by geography and end-use market. Despite a subdued and uneven economic backdrop, PPG's aggregate sales volumes grew modestly versus the prior year. Acquisition-related sales from the six acquisitions completed in 2015 and the two completed in 2016 contributed to net sales growth year-over-year. These net sales increases were offset by significant unfavorable foreign currency translation as the U.S. dollar strengthened against most foreign currencies throughout the year, primarily the Mexican peso, the British pound, and the Chinese yuan.

U.S. and Canada

During 2016, the pace of economic activity remained mixed by end-use market in the U.S. and Canada region, with contraction in industrial production, including lower automotive industry builds versus prior year, coupled with growth in other end-use markets. Demand increased in the residential and commercial construction markets albeit at a slower pace versus 2015. New home starts advanced about 5% in 2016 versus approximately 10% in 2015 with similar growth rate declines experienced in residential remodeling and commercial construction. PPG's packaging coatings business continued to expand well ahead of the industry end-use market growth due to continued strong sales growth momentum related to customer adoption of PPG's new interior can coatings technologies. The refinish coatings business benefited from higher miles driven aided by continued low gasoline prices. PPG's automotive OEM business lagged industry demand levels due to a customer-driven market-share shift away from PPG that was offset in other regions of the world. The U.S. and Canada region remained PPG's largest, representing approximately 45% of 2016 sales, consistent with the prior year.

EMEA

European economic activity continued to strengthen modestly in 2016 despite regional uncertainty due to the United Kingdom's vote to exit the European Union. Overall GDP and industrial production improved modestly in the region but at a slower pace versus 2015. Regional demand continued to be mixed by country and end-use market. PPG experienced sales volume growth in each 2016 quarter, with the first half of the year growing faster than the second half due, in part, to a comparison to more robust growth in the second half of 2015. Demand for PPG's products in several end-use markets drove the regional growth rate, including above market performance in automotive OEM and general industrial coatings.

Europe, Middle East, Africa (EMEA) remains a large region for PPG, representing approximately 30% of PPG's 2016 sales, similar to prior year levels. Regional coatings volumes remain approximately 16% below their pre-recession levels in 2008. The modest volume recovery reflects the slow pace of economic growth in the region. PPG expects continued volume growth over time at attractive incremental margins due to significant cost structure improvements and available capacity to satisfy additional demand. The euro and other regional currencies were relatively stable throughout the first half of 2016. In the second half of the year, the British pound declined meaningfully versus the U.S. dollar due to the economic uncertainty surrounding the vote to exit the European Union. In addition, the euro experienced a moderate decline versus the U.S. dollar after the American presidential election in November.

Asia Pacific and Latin America

The emerging regional markets of Asia Pacific and Latin America represented 25% of PPG's 2016 sales in aggregate, in line with the prior year, which increased from 22% in 2014 primarily due to the Comex acquisition in Mexico. Asia remained the largest emerging region, with sales of approximately $2.4 billion, led by China which continued as PPG's second largest country by revenue. Sales volume growth in Asia was led by the Industrial Coatings segment, in part due to strong automotive industry build growth, general industrial growth and continued adoption of PPG's interior can coatings technologies within the packaging industry. These increases were partially offset by the continued demand decline in the marine shipbuilding industry.

Overall, demand in Latin America remained subdued, with continued above market growth in Mexico and Central America, offset by slow overall demand growth in South America, primarily Brazil. In Mexico, the PPG-Comex business added over 200 new retail outlets, and automotive industry production accelerated in the second half of the year due to the opening of new automotive assembly plants within the country. Sales volumes continued to increase year-over-year, despite significant unfavorable foreign currency translation, principally from the Mexican peso. In Central America, the company continued to grow organically following a 2015 acquisition to expand its presence in the architectural end-use market.

Regional Outlook

Looking ahead to 2017, we expect to continue to operate in an evolving macroeconomic and regulatory environment. We anticipate improved momentum in overall global economic growth, including gradually higher growth rates in developed regions and continuing but uneven growth in emerging regions. We expect economic growth rates to improve in the U.S. and Canada and Latin America regions led by underlying improvements in GDP and industrial production. We anticipate PPG's U.S. and Canada regional growth will be led by industrial and packaging coatings partially offset by a decline in automotive industry builds. We continue to expect growth in the housing and commercial construction markets but at a slower pace than 2016. In Latin America, we anticipate economic expansion will be led by Mexico, albeit at a slower pace than 2016, and for South America to return to flat or slightly positive year-over-year growth following a multi-year contraction in economic output.

We expect growth rates to expand versus prior year in EMEA and Asia Pacific. In Europe, economic growth rates will remain mixed by sub-region and country. Favorable end-use market trends are expected to continue, particularly in automotive OEM coatings as industry build growth rates are anticipated to remain positive. In Asia Pacific, we expect continued industrial production growth in China as well as gains in Southeast Asia and India. Automotive build growth is expected to remain positive, but at a more modest growth rate versus 2016.

Significant other factors

During 2016, PPG finalized the divestiture of its flat glass and European fiber glass businesses as well as the sale of other businesses and business affiliates. The company received total cash proceeds of approximately $1.1 billion from these transactions.

In December 2016, PPG initiated a $197 million global restructuring program, with anticipated annual savings of approximately $125 million once fully implemented. The expected cost savings are broadly spread across all regions and all business units. The company expects to achieve $40 million to $50 million in savings in 2017 with the remainder of the projected annual savings to be substantially realized by year-end 2018. The company finalized all actions related to its 2015 restructuring program, achieving approximately $60 million of incremental savings during 2016. PPG will continue to aggressively manage the company’s cost structure to ensure alignment with the overall demand environment, and make adjustments as required to remain competitive in the marketplace.

Raw materials are a significant input cost to the process of manufacturing coatings. PPG typically experiences fluctuating prices for energy and raw materials driven by various factors, including changes in supplier feedstock costs and inventories, global industry activity levels, foreign currency exchange rates, and global supply and demand factors. In aggregate, average raw material costs were lower in 2016 versus 2015, with certain raw materials experiencing price inflation late in the year. These savings were partially offset by unfavorable foreign currency transaction costs as some key raw materials are traded in U.S. dollars globally. PPG currently expects overall coatings raw material prices to increase modestly in 2017, with impacts varied by region and commodity.

Pension and post-retirement benefit costs, excluding settlements, curtailments and special termination benefits, were $120 million in 2016, down approximately $55 million from 2015. In 2017, we expect pension and other postretirement benefit costs to decrease by approximately $15 million to $20 million due to U.S. postretirement medical plan design changes made in 2016.

During 2016, the company took significant steps to reduce financial risk and settle long-term obligations. First, PPG contributed approximately $800 million (pre-tax) to complete its long-standing involvement in the Pittsburgh Corning bankruptcy by fully funding its obligations to the Pittsburgh Corning asbestos settlement trust, which included the prepayment of all future obligations at a 5.5% discount. The company has no further obligations for the trust’s operation, management, or funding. Second, PPG permanently transferred approximately $1.8 billion of its U.S. and Canadian pension obligations and assets to several highly rated insurance companies. These actions are expected to reduce volatility in PPG’s financial statements related to changes in pension discount rates and assumed participant mortality. As a result of these changes, PPG contributed $146 million to its U.S. pension plans in the second half of 2016 and $29 million in January 2017. In 2016, the Company made contributions aggregating $204 million to its U.S. and non-U.S. pension plans. In 2017, mandatory

contributions to PPG’s non-U.S. pension plans are expected to be between $20 million and $30 million.

In 2016, aggregate selling prices were nearly flat year-over-year, reflecting lower raw material prices which were partly offset by increases in employee-related costs. Selective pricing actions are planned for 2017, including announced price increases in architectural coatings company-owned stores in various parts of the world to reflect higher input costs on certain commodities experienced during 2016. In aggregate, the company expects selling prices to remain generally flat in 2017. The company will carefully monitor the price of oil-based raw materials, as the price of oil rose modestly in the later part of 2016, and other significant coatings feedstock prices throughout the year and assess the need to increase selling prices to compensate for increases in raw material costs.

In 2016, unfavorable foreign currency translation reduced sales by approximately $400 million and pre-tax income by about $70 million as the U.S. dollar strengthened against most foreign currencies throughout the year, primarily the Mexican peso, British pound, and Chinese yuan. Based on mid-January 2017 exchange rates, the company expects year-over-year unfavorable foreign currency translation to reduce 2017 sales by $375 million to $425 million and 2017 pre-tax income by about $70 million to $90 million. These unfavorable impacts will be greater in the first half of 2017 as the U.S. dollar strengthened significantly versus most foreign currencies in the second half of 2016. The foreign currency environment continues to be volatile and the impact on 2017 net sales and pre-tax income could differ from the guidance. The Company generally purchases raw materials, incurs manufacturing costs and sells finished goods in the same currency, so we typically incur only modest foreign currency transaction costs.

The Company expects interest expense, net of interest income, in 2017 to be approximately $5 million to $10 million higher than 2016 due to a $110 million increase in PPG's outstanding debt obligations, despite a lower overall interest rate on it's aggregate debt portfolio. In the fourth quarter of 2016, PPG issued approximately €900 million of public notes at rates below 1% with terms ranging from three to nine years.

The Company's 2017 effective tax rate from continuing operations is expected to be in the range of 24.5% and 25.5%. This is slightly higher than the equivalent rate in 2016 primarily due to a shift in the mix of earnings to jurisdictions with higher statutory tax rates. Other factors may impact the expected 2017 effective tax rate positively or negatively throughout the year, including changes to various statutory tax rates and regulations around the world.

Over the past five years, the Company used $3.6 billion of cash to repurchase about 39 million shares of PPG stock including over $1.0 billion in 2016. The Company ended the year with approximately $1.9 billion remaining under its current share repurchase authorization. During 2016, the Company deployed approximately $350 million for acquisitions and approximately $415 million for dividends. PPG increased its annual per-share dividend by 11% in 2016, marking the 45th annual increase and the 117th consecutive year of dividend payments. The Company achieved the top end of its 2015 and 2016 cash deployment target for acquisitions and share repurchases, set at $1.5 billion to $2.5 billion, deploying $2.5 billion.

In January 2017, the Company announced a new cash deployment target for acquisitions and share repurchases of between $2.5 billion and $3.5 billion for the years 2017 and 2018 combined. PPG ended 2016 with approximately $1.9 billion in cash and short term investments, including the benefit of $1 billion of total proceeds from the business divestitures completed in late 2016. The Company expects continued strong free cash generation in 2017.

Accounting Standards Adopted in 2016

Note 1, “Summary of Significant Accounting Policies,” under Item 8 of this Form 10-K describes the Company’s recently adopted accounting pronouncements.

Accounting Standards to be Adopted in Future Years

Note 1, “Summary of Significant Accounting Policies,” under Item 8 of this Form 10-K describes accounting pronouncements that have been promulgated prior to December 31, 2016 but are not effective until a future date.

Commitments and Contingent Liabilities, including Environmental Matters

PPG is involved in a number of lawsuits and claims, both actual and potential, including some that it has asserted against others, in which substantial monetary damages are sought. See Item 3, “Legal Proceedings” and Note 13, “Commitments and Contingent Liabilities,” under Item 8 of this Form 10-K for a description of certain of these lawsuits. As discussed in Item 3 and Note 13, although the result of any future litigation of such lawsuits and claims is inherently unpredictable, management believes that, in the aggregate, the outcome of all lawsuits and claims involving PPG, including asbestos-related claims, will not have a material effect on PPG’s consolidated financial position or liquidity; however, any such outcome may be material to the results of operations of any particular period in which costs, if any, are recognized.

It is PPG’s policy to accrue expenses for contingencies when it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. Reserves for environmental contingencies are exclusive of claims against third parties and are generally not discounted. In management’s opinion, the Company operates in an environmentally sound manner and the outcome of the Company’s environmental contingencies will not have a material effect on PPG’s financial position or liquidity; however, any such outcome may be material to the results of operations of any particular period in which costs, if any, are recognized. Management anticipates that the resolution of the Company’s environmental contingencies will occur over an extended period of time.

The Company continues to analyze, assess and remediate the environmental issues associated with PPG’s former chromium manufacturing plant in Jersey City, N.J. and associated sites (“New Jersey Chrome”). Information will continue to be generated from the ongoing groundwater remedial investigation activities related to New Jersey Chrome and will be incorporated into a final draft remedial action work plan for groundwater expected to be submitted to the New Jersey Department of Environmental Protection no later than 2020.

There are multiple, future events yet to occur, including further remedy selection and design, remedy implementation and execution and applicable governmental agency or community organization approvals. Considerable uncertainty exists regarding the timing of these future events for the New Jersey Chrome sites. Final resolution of these events is expected to occur over the next several years. As these events occur and to the extent that the cost estimates of the environmental remediation remedies change, the existing reserve for this environmental remediation matter will be adjusted.

Liquidity and Capital Resources

During the past three years, PPG has had sufficient financial resources to meet its operating requirements, to fund our capital spending, including acquisitions, share repurchases and pension plans and to pay increasing dividends to shareholders.

Cash and cash equivalents and short term investments

($ in millions)	December 31,	
	2016	2015
Cash and cash equivalents	$1,820	$1,311
Short term investments	43	144
Total	$1,863	$1,455

Summary cash flow information - continuing operations

($ in millions, except percentages)	December 31,			% Change	
	2016	2015	2014	2016 vs. 2015	2015 vs. 2014
Cash from operating activities	$1,241	$1,735	$1,718	(28.5)%	1.0 %
Cash from (used for) investing activities	$450	$(373)	$(889)	(220.6)%	(58.0)%
Cash used for financing activities	$(1,184)	$(754)	$(929)	57.0 %	(18.8)%

Cash from operating activities - continuing operations

The decrease in cash from operating activities - continuing operations in 2016 compared to 2015, was primarily due to fully funding PPG's portion of the Pittsburgh Corning asbestos trust (the "Trust") in 2016. The slight increase in cash from continuing operating activities in 2015 compared to 2014 was driven by higher income from continuing operations, largely offset by higher cash contributions to pension plans.

Operating working capital

Operating Working Capital is a subset of total working capital and represents (1) receivables from customers, net of allowance for doubtful accounts, (2) inventories, and (3) trade liabilities. See Note 3, "Working Capital Detail" under Item 8 of this Form 10-K for further information related to the components of the Company's Operating Working Capital. We believe Operating Working Capital represents the key components of working capital under the operating control of our businesses. Operating Working Capital at December 31, 2016 and 2015 was $2.1 billion and $2.3 billion, respectively.

A key metric we use to measure our working capital management is Operating Working Capital as a percentage of sales (fourth quarter sales annualized).

($ in millions, except percentages)	2016	2015
Trade Receivables, net	$2,324	$2,343
Inventories, FIFO	1,666	1,803
Trade Creditor’s Liabilities	1,940	1,886
Operating Working Capital	$2,050	$2,260
Operating Working Capital as % of Sales	14.7 %	15.9 %

Operating working capital at December 31, 2016 decreased $210 million compared with the prior year. Trade receivables from customers, net, as a percentage of 2016 fourth quarter sales, annualized, was 16.6%, up slightly from 16.5% for 2015. Days sales outstanding was 54 days in 2016, up 2 days from 2015. Inventories on a FIFO basis as a percentage of 2016 fourth quarter sales, annualized, was 11.9% compared to 12.7% in 2015. Inventory turnover was 4.6 times in 2016 and 4.4 times in 2015.

Environmental cash expenditures

Cash outlays related to environmental remediation activities were $47 million, $109 million, and $165 million in 2016, 2015 and 2014, respectively. We expect cash outlays for environmental remediation activities in 2017 to be between $50 million and $70 million.

Defined benefit pension plan contributions

($ in millions)	December 31,		
	2016	2015	2014
U.S. defined benefit pension contributions	$146	$234	$ 2
Non-U.S. defined benefit pension plans	$58	$39	$ 39

Following the transfer of certain U.S. retiree obligations and assets to third party insurers, PPG contributed $146 million and $29 million to its U.S. plans during 2016 and in January 2017, respectively. Some contributions to PPG’s non-U.S. defined benefit pension plans in 2016 were required by local funding requirements. PPG expects to make mandatory contributions to its non-U.S. plans in the range of $20 million to $30 million in 2017. PPG may make voluntary contributions to its defined benefit pension plans in 2017 and beyond.

Asbestos settlement trust funding

In June 2016, PPG fully funded its portion of the trust that was established by the U.S. Bankruptcy Court for the Western District of Pennsylvania in May 2016. PPG’s total cash obligations to fund the Trust totaled $813 million (pre-tax). The obligations included cash funding of $506 million (pre-tax) and the transfer of about 2.78 million shares of PPG common stock, which were hedged at approximately $22 per share. Cash paid to settle the derivative instrument totaled $49 million. These shares were already included in the Company’s outstanding diluted share count. Lastly, PPG relinquished any claim to its equity interest in Pittsburgh Corning and conveyed to the Trust its ownership interest in Pittsburgh Corning’s European subsidiary. In addition to the initial funding obligation, the company exercised an option to prepay all future cash obligations, totaling a net of $258 million (pre-tax), including a 5.5% prepayment discount of $61 million. All payments were applied against a previously established PPG reserve for the total asbestos trust

obligation. The company utilized cash on hand for the payments, and this funding had no impact on PPG’s previously stated cash-deployment targets. Refer to Note 13, “Commitments and Contingent Liabilities” under Item 1 of this Form 10-Q for additional information.

Cash used for investing activities - continuing operations

Capital expenditures, including business acquisitions

($ in millions, except percentages)	December 31,			% Change	
	2016	2015	2014	2016 vs. 2015	2015 vs. 2014
Capital expenditures [1]	$402	$454	$564	(11.5)%	(19.5)%
Business acquisitions, net of cash acquired [2]	$349	$320	$2,113	9.1 %	(84.9)%
Total capital expenditures, including acquisitions	$751	$774	$2,677	(3.0)%	(71.1)%

Capital expenditures, excluding acquisitions as a % of sales	2.7 %	3.1 %	3.8 %	(12.9)%	(18.4)%

(1) Includes modernization and productivity improvements, expansion of existing businesses and environmental control projects.

(2) Excluding cash acquired, business acquisitions totaled $362 million, $440 million, and $2,183 million in 2016, 2015 and 2014, respectively.

Capital expenditures related to modernization and productivity improvements, expansion of existing businesses and environmental control projects is expected to be in the range of 2.5% to 3.0% of sales during 2017.

A primary focus for the Company in 2017 will continue to be cash deployment focused on profitable income growth, including pursuing opportunities for additional strategic acquisitions.

In 2016, the Company acquired MetoKote and several other smaller companies. The total cost of the 2016 acquisitions, net of cash acquired, was $349 million.

In 2015, the Company spent $320 million, net of cash acquired, to make several strategic bolt-on business acquisitions. PPG also acquired approximately $40 million of third party debt.

In November 2014, the Company acquired Comex, an architectural coatings company with headquarters in Mexico City, Mexico. In 2014, PPG also completed the acquisition of several smaller companies. The total cost of the 2014 acquisitions, including acquired debt repaid, was $2,427 million, net of cash acquired.

Cash proceeds from divestitures

During 2016, PPG finalized the sale of its flat glass business and several other businesses and business affiliates. The Company received total cash proceeds of approximately $1.1 billion from the following business divestitures.

On October 1, 2016, PPG sold the assets and liabilities of its flat glass manufacturing and glass coatings operations to Vitro S.A.B. de C.V. PPG received approximately $740 million in cash proceeds. PPG reported the assets and liabilities of the flat glass business as "Assets held for sale" and "Liabilities held for sale" in the accompanying consolidated balance sheet at December 31, 2015 and the results of operations of the flat glass business as discontinued operations in the consolidated statements of income and cash flows for all periods presented.

On October 1, 2016, PPG sold its European fiber glass operations to glass manufacturer Nippon Electric Glass Co. Ltd. Manufacturing facilities in Hoogezand, Netherlands, and Wigan, England, and a research and development facility in Hoogezand were included in the transaction. The European fiber glass business manufactures reinforcement materials for thermoset and thermoplastic composite applications for the transportation, energy, infrastructure and consumer markets.

On November 18, 2016, PPG divested its 50% ownership interests in its two PFG fiber glass joint ventures to Nan Ya Plastics Corporation ("Nan Ya"), which currently controlled the other 50% ownership interest in the joint ventures. Nan Ya is affiliated with Taiwan-based Formosa Plastics Group.

In April 2016, PPG sold its minority ownership interest in Pittsburgh Glass Works LLC ("PGW") to LKQ Corporation concurrent with the majority partner's sale of its ownership interest.

In March 2014, PPG received $1.735 billion in cash proceeds for the sale of its 51% ownership interest in its Transitions Optical joint venture and 100% of its optical sunlens business to Essilor.

Cash used for financing activities - continuing operations

Share repurchase activity

($ in millions, except number of shares)	December 31,		
	2016	2015	2014
Number of shares repurchased (millions)	10.7	7.0	7.6
Cost of shares repurchased	$1,050	$751	$750

We anticipate completing additional share repurchases during 2017. The Company has approximately $1.9 billion remaining under the current authorization from the Board of Directors, which was approved in 2016. The current authorized repurchase program has no expiration date.

Dividends paid to shareholders

($ in millions)	December 31,		
	2016	2015	2014
Dividends paid to shareholders	$414	$383	$361

PPG has paid uninterrupted annual dividends since 1899, and 2016 marked the 45th consecutive year of increased annual per-share dividend payments to shareholders. The Company raised its per-share dividend by 11% to $0.40 per share in April 2016.

Debt issued and repaid

In December 2016, PPG paid $133 million, using cash on hand to redeem its $125 million 6.65% notes due 2018.

In the fourth quarter 2016, PPG prepaid two $250 million Term Loan Credit Agreements which PPG entered into during May 2016, using cash on hand.

In November 2016, PPG completed a public offering of €300 million 0.000% Notes due 2019 and €600 million 0.875% Notes due 2025 (together, the "Notes"). These Notes were issued pursuant to PPG's existing shelf registration statement. The aggregate cash proceeds from the Notes, net of discounts and fees, was $987 million. The proceeds were used to repay outstanding borrowings and for general corporate purposes. The Notes are denominated in Euro and have been designated as

hedges of net investments in the Company's European operations.

In January 2016, PPG repaid its $250 million 1.9% notes upon their maturity, using cash on hand.

In June 2015, PPG's €300 million notes matured, upon which the Company paid $336 million to settle these obligations using cash on hand.

In March 2015, PPG completed a public offering of €600 million 0.875% Notes due 2022 and €600 million 1.400% Notes due 2027. These notes were issued pursuant to PPG's existing shelf registration statement. The aggregate cash proceeds from the notes, net of discounts and fees, was approximately $1.24 billion. The proceeds were used to repay outstanding borrowings and for general corporate purposes.

In December 2014, PPG completed a debt refinancing which involved paying approximately $1.7 billion to redeem public notes which was funded by cash on hand and cash proceeds of approximately $1.2 billion from several debt issuances described below.

In November 2014, PPG completed a public offering of $300 million in principal amount of its 2.30% Notes due 2019. These notes were issued pursuant to PPG’s existing shelf registration statement. Also in November 2014, PPG entered into three Euro-denominated borrowings as follows:

- 3-year €500 million, EURIBOR based variable rate bank loan
- 15-year €80 million 2.5% fixed interest note
- 30-year €120 million 3.0% fixed interest note.

The ratio of total debt, including capital leases, to total debt and equity was 47% at December 31, 2016 up from 46% in 2015.

Credit agreements and lines of credit

In December 2015, PPG entered into a five-year credit agreement (the “Credit Agreement”) with several banks and financial institutions as further discussed in Note 8, “Borrowings and Lines of Credit” under Item 8 of this Form 10-K. The Credit Agreement replaced the Company's existing Five Year Credit Agreement dated as of September 12, 2012. The Credit Agreement provides for a $1.8 billion unsecured revolving credit facility. The Credit Agreement will terminate on December 18, 2020. During the years ended December 31, 2016 and 2015, there were no borrowings outstanding under the existing or the prior Credit Agreement.

In addition to the amounts available under the lines of credit, the Company has an automatic shelf registration statement on file with the SEC pursuant to which it may issue, offer and sell from time to time on a continuous or delayed basis any combination of securities in one or more offerings.

See Note 8, “Borrowings and Lines of Credit,” under Item 8 of this Form 10-K for information regarding notes entered entered into and repaid as well as details regarding the use and availability of committed and uncommitted lines of credit, letters of credit, guarantees and debt covenants.

Contractual obligations

We continue to believe that our cash on hand and short term investments, cash from operations and the Company's available debt capacity will continue to be sufficient to fund our operating activities, capital spending, including acquisitions, dividend payments, debt service, share repurchases, contributions to pension plans, and PPG's significant contractual obligations. These significant contractual obligations are presented in the following table.

		Obligations Due In:			
($ in millions)	Total	2017	2018-2019	2020-2021	There-after
Contractual Obligations					
Long-term debt	$4,299	$526	$ 612	$ 627	$ 2,534
Short-term debt	99	99	—	—	—
Capital lease obligations	18	4	6	3	5
Operating leases	854	200	295	159	200
Interest payments(1)	1,038	95	175	133	635
Pension contributions(2)	59	59	—	—	—
Unconditional purchase commitments(3)	144	66	45	11	22
Other commitments	38	—	—	38	—
Total	$6,549	$1,049	$ 1,133	$ 971	$ 3,396

(1) Includes interest on all outstanding debt.

(2) Includes the high end of the range of the expected mandatory pension contributions for 2017 only, as PPG is unable to estimate the pension contributions beyond 2017. Also includes $29 million of contributions made to PPG's U.S. plans in January 2017, following the transfer of U.S. retiree obligations and assets to third party insurers.

(3) The unconditional purchase commitments are principally take-or-pay obligations related to the purchase of certain materials, including industrial gases and electricity, consistent with customary industry practice.

Other liquidity matters

At December 31, 2016, the total amount of unrecognized tax benefits for uncertain tax positions, including an accrual of related interest and penalties along with positions only impacting the timing of tax benefits, was $103 million. The timing of payments will depend on the progress of examinations with tax authorities. PPG does not expect a significant tax payment related to these obligations within the next year. The Company is unable to make a reasonably reliable estimate as to when any significant cash settlements with taxing authorities may occur.

The Company had $5.3 billion of undistributed earnings of non-U.S. subsidiaries as of December 31, 2016 and $5.0 billion as of December 31, 2015. These amounts relate to approximately 250 subsidiaries in more than 75 taxable jurisdictions. Over the past several years, PPG has established deferred tax liabilities on specific undistributed earnings, namely in connection with divestitures and the funding of the Trust. At December 31, 2016 and 2015, the expected future tax cost to repatriate these foreign earnings which are not permanently reinvested totaled $189 million and $158 million, respectively. No significant deferred U.S. income taxes have been provided on the remaining $3.5 billion and $4.2 billion of PPG's undistributed earnings as they are considered to be reinvested for an indefinite period of time or will be repatriated when it is tax effective to do so. The Company estimates repatriation of undistributed earnings of non-U.S. subsidiaries as of

December 31, 2016 and 2015 would have resulted in a U.S. tax cost of approximately $350 million and $375 million, respectively.

Off-Balance Sheet Arrangements

The Company's off-balance sheet arrangements include the operating leases and unconditional purchase commitments disclosed in the "Liquidity and Capital Resources" section in the contractual obligations table as well as letters of credit and guarantees as discussed in Note 8, "Borrowings and Lines of Credit," under Item 8 of this Form 10-K.

Critical Accounting Estimates

Management has evaluated the accounting policies used in the preparation of the financial statements and related notes presented under Item 8 of this Form 10-K and believes those policies to be reasonable and appropriate. We believe that the most critical accounting estimates made in the preparation of our financial statements are those related to accounting for contingencies, under which we accrue a loss when it is probable that a liability has been incurred and the amount can be reasonably estimated, and to accounting for pensions, other postretirement benefits, business combinations, goodwill and other identifiable intangible assets with indefinite lives because of the importance of management judgment in making the estimates necessary to apply these policies.

Contingencies

Contingencies, by their nature, relate to uncertainties that require management to exercise judgment both in assessing the likelihood that a liability has been incurred as well as in estimating the amount of potential loss. The most important contingencies impacting our financial statements are those related to the collectability of accounts receivable, to environmental remediation, to pending, impending or overtly threatened litigation against the Company and to the resolution of matters related to open tax years. For more information on these matters, see Note 3, “Working Capital Detail,” Note 11, “Income Taxes” and Note 13, “Commitments and Contingent Liabilities” under Item 8 of this Form 10-K.

Defined Benefit Pension and Other Postretirement Benefit Plans

Accounting for pensions and other postretirement benefits involves estimating the cost of benefits to be provided well into the future and attributing that cost over the time period each employee works. To accomplish this, we make extensive use of assumptions about inflation, investment returns, mortality, turnover, medical costs and discount rates. The Company has established a process by which management reviews and selects these assumptions annually. See Note 12, “Employee Benefit Plans,” under Item 8 for information on these plans and the assumptions used.

Business Combinations

In accordance with the accounting guidance for business combinations, the Company uses the acquisition method of accounting to allocate costs of acquired businesses to the assets acquired and liabilities assumed based on their estimated fair values at the dates of acquisition. The excess costs of acquired businesses over the fair values of the assets acquired and liabilities assumed were recognized as goodwill. The valuations of the acquired assets and liabilities will impact the determination of future operating results. In addition to using management estimates and negotiated amounts, the Company uses a variety of information sources to determine the estimated fair values of acquired assets and liabilities including: third-party appraisals for the estimated value and lives of identifiable intangible assets and property, plant and equipment; third-party actuaries for the estimated obligations of defined benefit pension plans and similar benefit obligations; and legal counsel or other experts to assess the obligations associated with legal, environmental and other contingent liabilities. The business and technical judgment of management was used in determining which intangible assets have indefinite lives and in determining the useful lives of finite-lived intangible assets in accordance with the accounting guidance for goodwill and other intangible assets.

Goodwill and Intangible Assets

The Company tests indefinite-lived intangible assets and goodwill for impairment annually by either performing a qualitative evaluation or a quantitative test. The qualitative evaluation is an assessment of factors to determine whether it is more likely than not that the fair values of a reporting unit or asset is less than its carrying amount. Fair values under the quantitative test are estimated using discounted cash flow methodologies that are based on projections of the amounts and timing of future revenues and cash flows. For more information on these matters, see Note 1, “Summary of Significant Accounting Policies,” under Item 8 of this Form 10-K.

We believe that the amounts recorded in the financial statements under Item 8 of this Form 10-K related to these contingencies, pensions, other postretirement benefits, business combinations, goodwill and other identifiable intangible assets with indefinite lives are based on the best estimates and judgments of the appropriate PPG management, although actual outcomes could differ from our estimates.

Currency

Comparing exchange rates from December 31, 2015 to December 31, 2016 and December 31, 2014 to December 31, 2015, the U.S. dollar strengthened against the currencies in most countries in which PPG operates, most notably the Mexican peso, British pound, Chinese yuan and euro. As a result, consolidated net assets at December 31, 2016 and 2015 decreased by approximately $465 million and $705 million, respectively.

Comparing exchange rates during 2016 to those of 2015, in the countries in which PPG operates, the U.S. dollar was stronger overall, which had an unfavorable impact of approximately $70 million on full year 2016 income before income taxes from the translation of this foreign income into U.S. dollars.

Comparing exchange rates during 2015 to those of 2014, in the countries in which PPG operates, the U.S. dollar was stronger overall, which had an unfavorable impact of approximately $120 million on full year 2015 income before income taxes from the translation of this foreign income into U.S. dollars.

Forward-Looking Statements

The Private Securities Litigation Reform Act of 1995 provides a safe harbor for forward-looking statements made by or on behalf of the Company. Management’s Discussion and Analysis and other sections of this Annual Report contain forward-looking statements that reflect the Company’s current views with respect to future events and financial performance.

You can identify forward-looking statements by the fact that they do not relate strictly to current or historic facts. Forward-looking statements are identified by the use of the words “aim,” “believe,” “expect,” “anticipate,” “intend,” “estimate, “project,” “outlook,” “forecast” and other expressions that indicate future events and trends. Any forward-looking statement speaks only as of the date on which such statement is made, and the Company undertakes no obligation to update any forward looking statement, whether as a result of new information, future events or otherwise. You are advised, however, to consult any further disclosures we make on related subjects in our reports to the Securities and Exchange Commission. Also, note the following cautionary statements.

Many factors could cause actual results to differ materially from the Company’s forward-looking statements. Such factors include global economic conditions, increasing price and product competition by foreign and domestic competitors, fluctuations in cost and availability of raw materials, our ability to maintain favorable supplier relationships and arrangements, the timing of and the realization of anticipated cost savings from restructuring initiatives, difficulties in integrating acquired businesses and achieving expected synergies therefrom, economic and political conditions in the markets we serve, ability to penetrate existing, developing and emerging foreign and

domestic markets, foreign exchange rates and fluctuations in such rates, fluctuations in tax rates, the impact of future legislation, the impact of environmental regulations, unexpected business disruptions and the unpredictability of existing and possible future litigation. However, it is not possible to predict or identify all such factors.
Consequently, while the list of factors presented here and under Item 1A is considered representative, no such list should be considered to be a complete statement of all potential risks and uncertainties. Unlisted factors may present significant additional obstacles to the realization of forward-looking statements.
Consequences of material differences in the results compared with those anticipated in the forward-looking statements could include, among other things, lower sales or earnings, business disruption, operational problems, financial loss, legal liability to third parties, other factors set forth in Item 1A of this Form 10-K and similar risks, any of which could have a material adverse effect on the Company’s consolidated financial condition, results of operations or liquidity.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

PPG is exposed to market risks related to changes in foreign currency exchange rates, interest rates, and was exposed to changes in PPG’s stock price. The Company may enter into derivative financial instrument transactions in order to manage or reduce these market risks. A detailed description of these exposures and the Company’s risk management policies are provided in Note 9, “Financial Instruments, Hedging Activities and Fair Value Measurements,” under Item 8 of this Form 10-K.

The following disclosures summarize PPG’s exposure to market risks and information regarding the use of and fair value of derivatives employed to manage its exposure to such risks. Quantitative sensitivity analyses have been provided to reflect how reasonably possible, unfavorable changes in market rates can impact PPG’s consolidated results of operations, cash flows and financial position.

Foreign Currency Risk

We conduct operations in many countries around the world. Our results of operations are subject to both currency transaction and currency translation risk. Foreign currency forward contracts outstanding during 2016 and 2015 were generally designated as a hedge of PPG’s exposure to foreign currency transaction risk. As of December 31, 2016 and 2015, the fair value of these contracts was a net asset of $16 million. The potential reduction in PPG’s income from continuing operations resulting from the impact of adverse changes in exchange rates on the fair value of its outstanding foreign currency hedge contracts of 10% for European and Canadian currencies and 20% for Asian and Latin American currencies for the years ended December 31, 2016 and 2015 would have been $105 million and $29 million, respectively.

As of December 31, 2016 and 2015, PPG had U.S. dollar to Euro cross currency swap contracts with a total notional amount of $560 million outstanding. As of December 31, 2016 and 2015, the fair value of these contracts was a net asset of $65 million and $41 million, respectively. A 10% increase in the value of the Euro to the U.S. dollar would have had an unfavorable effect on the fair value of these swap contracts by reducing the value of this instrument by $54 million as of December 31, 2016 and increasing the liability by $60 million at December 31, 2015.

As of December 31, 2016 and 2015, PPG had non-U.S. dollar denominated debt outstanding of $3.1 billion and $2.1 billion, respectively. A weakening of the U.S. dollar by 10% against European currencies and by 20% against Asian and South American currencies would have resulted in unrealized translation losses of $344 million and $242 million as of December 31, 2016 and 2015, respectively.

Interest Rate Risk

The Company manages its interest rate risk by balancing its exposure to fixed and variable rates while attempting to minimize its interest costs. A 10% increase in interest rates in the U.S., Canada, Mexico and Europe and a 20% increase in interest rates in Asia and South America would have an insignificant effect on PPG’s variable rate debt obligations and interest expense for the years ended December 31, 2016 and 2015, respectively. Further, a 10% reduction in interest rates would have increased the present value of the Company’s fixed rate debt by approximately $65 million and $75 million as of December 31, 2016 and 2015, respectively; however, such changes would not have had an effect on PPG’s annual income from continuing operations or cash flows.

Equity Price Risk

In prior years, PPG entered into equity forward arrangements to hedge the Company’s exposure to changes in the fair value of its future obligation to contribute PPG stock to the Trust (see Note 9, “Financial Instruments, Hedging Activities and Fair Value Measurements” and Note 13, “Commitments and Contingent Liabilities,” under Item 8 of this Form 10-K). In June 2016, PPG satisfied its funding obligation to the Trust and the equity forward arrangements were settled. At settlement, the aggregated fair value of the equity forward arrangements was an asset of $258 million.

As of December 31, 2015, the aggregated fair value of these instruments was an asset of $223 million. A 10% decrease in PPG’s stock price would have had an unfavorable effect on the fair value of these instruments of $27 million as of December 31, 2015.

Item 8. Financial Statements and Supplementary Data

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of PPG Industries, Inc.

In our opinion, the accompanying consolidated balance sheets and the related consolidated statements of income, comprehensive income, shareholders’ equity, and cash flows present fairly, in all material respects, the financial position of PPG Industries, Inc. and its subsidiaries at December 31, 2016 and 2015, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2016 in conformity with accounting principles generally accepted in the United States of America. In addition, in our opinion, the financial statement schedule listed in the index appearing under Item 15(a)(2) presents fairly, in all material respects, the information set forth therein when read in conjunction with the related consolidated financial statements. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The Company's management is responsible for these financial statements and financial statement schedule, for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management Report on Establishing and Maintaining Adequate Internal Control Over Financial Reporting. Our responsibility is to express opinions on these financial statements, on the financial statement schedule, and on the Company's internal control over financial reporting based on our integrated audits. We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement and whether effective internal control over financial reporting was maintained in all material respects. Our audits of the financial statements included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

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

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

/s/ PricewaterhouseCoopers LLP
Pittsburgh, Pennsylvania
February 16, 2017

Management Report

Responsibility for Preparation of the Financial Statements and Establishing and Maintaining Adequate Internal Control Over Financial Reporting

We are responsible for the preparation of the financial statements included in this Annual Report. The financial statements were prepared in accordance with accounting principles generally accepted in the United States of America and include amounts that are based on the best estimates and judgments of management.

We are also responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934, as amended. Internal control over financial reporting, no matter how well designed, have inherent limitations. Therefore, a system of internal control over financial reporting can provide only reasonable assurance and may not prevent or detect misstatements. In addition, because of changing conditions, there is risk in projecting any evaluation of internal controls to future periods.

We conducted an evaluation of the effectiveness of the Company's internal control over financial reporting as of December 31, 2016. In making this evaluation, we used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control - Integrated Framework (2013). Our evaluation included reviewing the documentation of our controls, evaluating the design effectiveness of our controls and testing their operating effectiveness. Based on this evaluation we have concluded that, as of December 31, 2016, the Company's internal controls over financial reporting were effective.

PricewaterhouseCoopers LLP, an independent registered public accounting firm, has issued their report, included on page 34 of this Form 10-K, regarding the Company's internal control over financial reporting.

/s/ Michael H. McGarry	/s/ Frank S. Sklarsky
Michael H. McGarry	Frank S. Sklarsky
Chairman and	Executive Vice President and
Chief Executive Officer	Chief Financial Officer
February 16, 2017	February 16, 2017

Consolidated Statement of Income

	For the Year		
($ in millions, except per share amounts)	2016	2015	2014
Net sales	$14,751	$14,766	$14,791
Cost of sales, exclusive of depreciation and amortization	8,063	8,206	8,348
Selling, general and administrative	3,662	3,624	3,696
Depreciation	341	339	324
Amortization	121	132	126
Research and development, net	466	476	483
Interest expense	125	125	187
Interest income	(26)	(39)	(50)
Asbestos settlement, net	5	12	12
Business restructuring	197	140	—
Debt refinancing charge	—	—	317
Pension settlement charges	968	—	—
Other charges	178	93	217
Other income	(176)	(125)	(215)
Income before income taxes	$827	$1,783	$1,346
Income tax expense	241	424	237
Income from continuing operations	$586	$1,359	$1,109
Income from discontinued operations, net of tax	313	68	1,050
Net income attributable to the controlling and noncontrolling interests	$899	$1,427	$2,159
Less: net income attributable to noncontrolling interests	22	21	57
Net income (attributable to PPG)	$877	$1,406	$2,102
Amounts Attributable to PPG			
Continuing operations	$564	$1,338	$1,085
Discontinued operations	313	68	1,017
Net income	$877	$1,406	$2,102
Earnings per common share			
Continuing operations	$2.12	$4.93	$3.92
Discontinued operations	1.18	0.25	3.68
Net income (attributable to PPG)	$3.30	$5.18	$7.60
Earnings per common share - assuming dilution			
Continuing operations	$2.11	$4.89	$3.88
Discontinued operations	1.17	0.25	3.64
Net income (attributable to PPG)	$3.28	$5.14	$7.52

Consolidated Statement of Comprehensive Income

	For the Year		
($ in millions)	2016	2015	2014
Net income attributable to the controlling and noncontrolling interests	$899	$1,427	$2,159
Unrealized foreign currency translation adjustment	(476)	(717)	(596)
Defined benefit pension and other postretirement benefit adjustments	808	113	(335)
Net change – derivative financial instruments	4	5	69
Other comprehensive (loss) / income, net of tax	336	(599)	(862)
Total comprehensive income	$1,235	$828	$1,297
Less: amounts attributable to noncontrolling interests:			
Net income	(22)	(21)	(57)
Unrealized foreign currency translation adjustment	10	13	6
Comprehensive income attributable to PPG	$1,223	$820	$1,246

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

Consolidated Balance Sheet

($ in millions)	December 31 2016	2015
Assets		
Current assets		
Cash and cash equivalents	$1,820	$1,311
Short-term investments	43	144
Receivables	2,692	2,709
Inventories	1,546	1,659
Assets held for sale	30	285
Other	321	604
Total current assets	$6,452	$6,712
Property, plant and equipment, net	2,759	2,822
Goodwill	3,572	3,669
Identifiable intangible assets, net	1,983	2,178
Deferred income taxes	154	711
Investments	179	367
Other assets	670	617
Total	$15,769	$17,076
Liabilities and Shareholders’ Equity		
Current liabilities		
Accounts payable and accrued liabilities	$3,510	$3,419
Asbestos settlement	—	796
Restructuring reserves	101	87
Short-term debt and current portion of long-term debt	629	281
Liabilities held for sale	—	112
Total current liabilities	$4,240	$4,695
Long-term debt	3,787	4,026
Accrued pensions	740	695
Other postretirement benefits	731	1,015
Asbestos settlement	—	252
Deferred income taxes	417	460
Other liabilities	941	864
Total liabilities	$10,856	$12,007
Commitments and contingent liabilities (See Note 13)		
Shareholders’ equity		
Common stock	$969	$969
Additional paid-in capital	701	635
Retained earnings	15,984	15,521
Treasury stock, at cost	(10,472)	(9,440)
Accumulated other comprehensive loss	(2,356)	(2,702)
Total PPG shareholders’ equity	$4,826	$4,983
Noncontrolling interests	87	86
Total shareholders’ equity	$4,913	$5,069
Total	$15,769	$17,076

The accompanying notes to the consolidated financial statements are an integral part of this consolidated statement.

Consolidated Statement of Shareholders' Equity

($ in millions)	Common Stock	Additional Paid-In Capital	Retained Earnings	Treasury Stock	Accumulated Other Comprehensive Income/(Loss)	Total PPG	Non-controlling Interests	Total
Balance, January 1, 2014	$ 484	$ 953	$ 12,757	$ (8,002)	$ (1,260)	$ 4,932	$ 266	$ 5,198
Net income attributable to the controlling and noncontrolling interests	—	—	2,102	—	—	2,102	57	2,159
Other comprehensive loss, net of tax	—	—	—	—	(856)	(856)	(6)	(862)
Cash dividends	—	—	(361)	—	—	(361)	—	(361)
Purchase of treasury stock	—	—	—	(750)	—	(750)	—	(750)
Issuance of treasury stock	—	39	—	38	—	77	—	77
Stock-based compensation activity	—	64	—	—	—	64	—	64
Dividends paid on subsidiary common stock to noncontrolling interests	—	—	—	—	—	—	(50)	(50)
Reductions in noncontrolling interests	—	(28)	—	—	—	(28)	(182)	(210)
Balance, December 31, 2014	$ 484	$ 1,028	$ 14,498	$ (8,714)	$ (2,116)	$ 5,180	$ 85	$ 5,265
Net income attributable to the controlling and noncontrolling interests	—	—	1,406	—	—	1,406	21	1,427
Other comprehensive loss, net of tax	—	—	—	—	(586)	(586)	(13)	(599)
Cash dividends	—	—	(383)	—	—	(383)	—	(383)
2:1 Stock split	485	(485)	—	—	—	—	—	—
Purchase of treasury stock	—	—	—	(751)	—	(751)	—	(751)
Issuance of treasury stock	—	46	—	25	—	71	—	71
Stock-based compensation activity	—	46	—	—	—	46	—	46
Dividends paid on subsidiary common stock to noncontrolling interests	—	—	—	—	—	—	(4)	(4)
Reductions in noncontrolling interests	—	—	—	—	—	—	(3)	(3)
Balance, December 31, 2015	$ 969	$ 635	$ 15,521	$ (9,440)	$ (2,702)	$ 4,983	$ 86	$ 5,069
Net income attributable to the controlling and noncontrolling interests	—	—	877	—	—	877	22	899
Other comprehensive income, net of tax	—	—	—	—	346	346	(10)	336
Cash dividends	—	—	(414)	—	—	(414)	—	(414)
Purchase of treasury stock	—	—	—	(1,050)	—	(1,050)	—	(1,050)
Issuance of treasury stock	—	37	—	18	—	55	—	55
Stock-based compensation activity	—	29	—	—	—	29	—	29
Dividends paid on subsidiary common stock to noncontrolling	—	—	—	—	—	—	(4)	(4)

interests								
Other transactions	—	—	—	—	—	—	(7)	(7)
Balance, December 31, 2016	$ 969	$ 701	$15,984	$(10,472)	$ (2,356)	$4,826	$ 87	$4,913

The accompanying notes to the consolidated financial statements are an integral part of this consolidated statement.

Consolidated Statement of Cash Flows

	For the Year		
($ in millions)	2016	2015	2014
Operating activities			
Net income attributable to the controlling and noncontrolling interests	$899	$1,427	$2,159
Less: Income from discontinued operations	313	68	1,050
Income from continuing operations	$586	$1,359	$1,109
Adjustments to reconcile to cash from operations:			
Depreciation and amortization	462	471	450
Defined benefit pension expense	86	91	58
Pension settlement charge	968	—	—
Business restructuring charge	197	140	—
Environmental remediation charge	82	—	138
Stock-based compensation expense	39	54	71
Net gain, from sale of businesses	(40)	—	—
Equity affiliate (earnings)/losses, net of dividends	(4)	63	(56)
Deferred income taxes	155	(1)	(87)
Cash contributions to pension plans	(204)	(273)	(41)
Restructuring cash expenditures	(78)	(45)	(57)
Cash paid for asbestos settlement funding	(813)	—	—
Debt refinancing charge	—	—	317
Change in certain asset and liability accounts (net of acquisitions):			
Receivables	(59)	(150)	(116)
Inventories	61	31	(99)
Other current assets	24	(83)	(68)
Accounts payable and accrued liabilities	135	101	185
Noncurrent assets and liabilities, net	(56)	(97)	(129)
Taxes and interest payable	(247)	91	46
Other	(53)	(17)	(3)
Cash from operating activities - continuing operations	$1,241	$1,735	$1,718
Cash from/(used for) operating activities - discontinued operations	84	102	(190)
Cash from operating activities	$1,325	$1,837	$1,528
Investing activities			
Capital expenditures	$(402)	$(454)	$(564)
Business acquisitions, net of cash balances acquired	(349)	(320)	(2,113)
Net proceeds from the sale of businesses	1,094	47	1,625
Proceeds from maturity of short-term investments	92	402	1,298
Purchase of short-term investments	—	(97)	(1,204)
Payments on cross currency swap contracts	(36)	(34)	(45)
Proceeds from cross currency swap contracts	37	37	37
(Payments on) / Proceeds from net investment hedges	(13)	19	49
Other	27	27	28
Cash from/(used for) investing activities - continuing operations	$450	$(373)	$(889)
Cash (used for)/from investing activities - discontinued operations	(14)	(22)	32
Cash from/(used for) investing activities	$436	$(395)	$(857)
Financing activities			
Net change in borrowings with maturities of three months or less	$(15)	$(32)	$89
Net (payments)/proceeds on commercial paper and short-term debt	(361)	(528)	932
	988	1,242	1,163

Net proceeds from the issuance of long-term debt (net of discount and issuance costs)			
Repayment of long-term debt	(379)	(340)	(1,803)
Premium paid for redemption of securities	(8)	—	(222)
Purchase of treasury stock	(1,050)	(751)	(750)
Issuance of treasury stock	31	53	57
Dividends paid on PPG common stock	(414)	(383)	(361)
Other	24	(15)	(34)
Cash used for financing activities - continuing operations	$(1,184)	$(754)	$(929)
Cash used for financing activities - discontinued operations	—	—	(40)
Cash used for financing activities	$(1,184)	$(754)	$(969)
Effect of currency exchange rate changes on cash and cash equivalents	(68)	(63)	(132)
Net increase/(decrease) in cash and cash equivalents	$509	$625	$(430)
Cash and cash equivalents, beginning of year			