Baidu, Inc.
Form 20-F/A
June 24, 2011

Table of Contents

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

Form 20-F/A
(Amendment No. 1)

(Mark One)

o **REGISTRATION STATEMENT PURSUANT TO SECTION 12(b) OR 12(g) OF THE SECURITIES EXCHANGE ACT OF 1934**

or

þ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended December 31, 2010.

or

o **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the transition period from to

or

o **SHELL COMPANY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
Date of event requiring this shell company report

Commission file number: 000-51469

Baidu, Inc.

(Exact name of Registrant as specified in its charter)
N/A

(Translation of Registrant s name into English)

Cayman Islands
(Jurisdiction of incorporation or organization)

Baidu Campus
No. 10 Shangdi 10th Street
Haidian District, Beijing 100085
The People s Republic of China

(Address of principal executive offices)

Jennifer Li, Chief Financial Officer

Telephone: +(86 10) 5992-8888
Email: jenniferli@baidu.com
Facsimile: +(86 10) 5992-0000
Baidu Campus
No. 10 Shangdi 10th Street,
Haidian District, Beijing 100085
The People s Republic of China
(Name, Telephone, Email and/or Facsimile number and Address of Company Contact Person)

Securities registered or to be registered pursuant to Section 12(b) of the Act:

Title of Each Class	Name of Each Exchange on Which Registered
Class A ordinary shares, par value US$0.00005 per share	The NASDAQ Stock Market LLC* (The NASDAQ Global Select Market)

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

(Title of Class)

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Act:
None

(Title of Class)

Indicate the number of outstanding shares of each of the Issuer s classes of capital or common stock as of the close of the period covered by the annual report.

27,045,340 Class A ordinary shares and 7,804,332 Class B ordinary shares, par value US$0.00005 per share, as of December 31, 2010.

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

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. Yes o No þ

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes þ No o

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 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 þ No o

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, or a non-accelerated filer. See definition of accelerated filer and large accelerated filer in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer þ Accelerated filer o Non-accelerated filer o

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP þ

International Financial Reporting Standards as issued by the International Accounting Standards Board o Other o

If Other has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow.

Item 17 o

Item 18 o

If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes o No þ

(APPLICABLE ONLY TO ISSUERS INVOLVED IN BANKRUPTCY PROCEEDINGS DURING THE PAST FIVE YEARS)

Indicate by check mark whether the registrant has filed all documents and reports required to be filed by Sections 12, 13 or 15(d) of the Securities Exchange Act of 1934 subsequent to the distribution of securities under a plan confirmed by a court. Yes o No o

* Not for trading, but only in connection with the listing on The NASDAQ Global Select Market of American depositary shares (ADSs). Currently, 10 ADSs represent one Class A ordinary share.

TABLE OF CONTENTS

Table of Contents

EXPLANTARY NOTE

This Amendment No. 1 on Form 20-F/A (this Amendment No. 1) to our annual report on Form 20-F for the year ended December 31, 2010, filed with the Securities and Exchange Commission on March 29, 2011 (the 2010 Form 20-F), is filed solely for the purposes of correcting a clerical error in the 2010 Form 20-F. The electronic signature of Ernst & Young Hua Ming was inadvertently omitted from the Report of Independent Registered Public Accounting Firm, included in Item 8A and from the Report of Independent Registered Public Accounting Firm included in Item 15 in the 2010 Form 20-F. As required by Rule 12b-15 of the Securities and Exchange Act of 1934, as amended, the Company is also filing as exhibits to Amendment No. 1 the certifications required under Section 302 of the Sarbanes-Oxley Act of 2002.

This Amendment No. 1 speaks as of the filing date of the 2010 Form 20-F on March 29, 2011. Other than as set forth above, this Amendment No. 1 does not, and does not purport to, amend, update or restate any other information or disclosure included in the 2010 Form 20-F or reflect any events that have occurred since March 29, 2011.

Table of Contents

Item 15. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our chief executive officer and chief financial officer, has performed an evaluation of the effectiveness of our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Exchange Act) as of the end of the period covered by this report, as required by Rule 13a-15(b) under the Exchange Act.

Based upon that evaluation, our management has concluded that, as of December 31, 2010, our disclosure controls and procedures were effective in ensuring that the information required to be disclosed by us in the reports that we file and furnish under the Exchange Act was recorded, processed, summarized and reported, within the time periods specified in the SEC s rules and forms, and that the information required to be disclosed by us in the reports that we file or submit under the Exchange Act is accumulated and communicated to our management, including our chief executive officer and chief financial officer, to allow timely decisions regarding required disclosure.

Management s Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rule 13a-15(f) under the Exchange Act. Our management evaluated the effectiveness of our internal control over financial reporting, as required by Rule 13a-15(c) of the Exchange Act, based on criteria established in the framework in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on this evaluation, our management has concluded that our internal control over financial reporting was effective as of December 31, 2010.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. In addition, projections of any evaluation of effectiveness of our internal control over financial reporting 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 and procedures may deteriorate.

Our independent registered public accounting firm, Ernst & Young Hua Ming, has audited the effectiveness of our internal control over financial reporting as of December 31, 2010, as stated in its report, which appears on page F-2 of this annual report on Form 20-F.

Changes in Internal Control over Financial Reporting

There were no changes in our internal controls over financial reporting that occurred during the period covered by this annual report on Form 20-F that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Table of Contents

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Board of Directors and Shareholders
Baidu, Inc.

We have audited the accompanying consolidated balance sheets of Baidu, Inc. (the Company) as of December 31, 2010 and 2009, and the related consolidated statements of income, shareholders equity, and cash flows for each of the three years in the period ended December 31, 2010. These financial statements are the responsibility of the Company s management. Our responsibility is to express an opinion on these financial statements based on our 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 audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the consolidated financial position of Baidu, Inc. as of December 31, 2010 and 2009, and the consolidated results of its operations and its cash flows for each of the three years in the period ended December 31, 2010, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), Baidu, Inc. s internal control over financial reporting as of December 31, 2010, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated March 29, 2011 expressed an unqualified opinion thereon.

/s/
Ernst & Young Hua Ming

Beijing, The People s Republic of China
March 29, 2011

Table of Contents

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Board of Directors and Shareholders
Baidu, Inc.

We have audited Baidu, Inc. s internal control over financial reporting as of December 31, 2010, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (the COSO criteria). Baidu, Inc. s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management s Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the company s internal control over financial reporting based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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 (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) 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 (3) 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.

In our opinion, Baidu, Inc. maintained, in all material respects, effective internal control over financial reporting as of December 31, 2010, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the accompanying consolidated balance sheets of Baidu, Inc. as of December 31, 2010 and 2009, and the related consolidated statements of income, shareholders equity, and cash flows for each of the three years in the period ended December 31, 2010 of Baidu, Inc., and our report dated March 29, 2011, expressed an unqualified opinion thereon.

/s/
Ernst & Young Hua Ming

Beijing, The People s Republic of China

March 29, 2011

5

Table of Contents

Item 18. Financial Statements

The consolidated financial statements of Baidu, Inc. and its subsidiaries are included on page F-1 through F-42 of the 2010 Form 20-F, which was filed on March 29, 2011.

Item 19. Exhibits

Exhibit Number	Description of Document
1.1	Third Amended and Restated Memorandum and Articles of Association of the Registrant (incorporated by reference to Exhibit 99.2 of Form 6-K furnished with the Securities and Exchange Commission on December 17, 2008)
2.1	Registrant s Specimen American Depositary Receipt (incorporated by reference to Exhibit 1 of the prospectus filed with the Securities and Exchange Commission on January 5, 2009 pursuant to Rule 424(b)(3) under the Securities Act)
2.2	Registrant s Specimen Certificate for Class A Ordinary Shares (incorporated by reference to Exhibit 4.2 of Amendment No. 5 to our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on August 2, 2005)
2.3	Form of Deposit Agreement among the Registrant, the depositary and holder of the American Depositary Receipts (incorporated by reference to Exhibit 4.3 to our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.1	Second Amended and Restated Shareholders Agreement, dated as of June 9, 2004, among the Registrant and other parties therein (incorporated by reference to Exhibit 4.4 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.2	2000 Option Plan (amended and restated effective December 16, 2008) (incorporated by reference to Exhibit 99.3 of Form 6-K furnished with the Securities and Exchange Commission on December 17, 2008)
4.3	2008 Share Incentive Plan (incorporated by reference to Exhibit 99.4 of Form 6-K furnished with the Securities and Exchange Commission on December 17, 2008)
4.4	Form of Indemnification Agreement with the Registrant s directors (incorporated by reference to Exhibit 10.3 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.5	Form of Employment Agreement between the Registrant and an Executive Officer of the Registrant (incorporated by reference to Exhibit 10.4 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.6	Translation of Technology Consulting and Services Agreement dated as of March 22, 2005 between Baidu Online and Baidu Netcom (incorporated by reference to Exhibit 99.2 of our Registration

	Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.7	Translation of Business Cooperation Agreement dated as of March 22, 2005 between Baidu Online and Baidu Netcom (incorporated by reference to Exhibit 99.3 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.8	Translation of Operating Agreement dated as of March 22, 2005 between Baidu Online and Baidu Netcom (incorporated by reference to Exhibit 99.4 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)

Table of Contents

Exhibit Number	Description of Document
4.9	Translation of Software License Agreement dated as of March 22, 2005 between Baidu Online and Baidu Netcom (incorporated by reference to Exhibit 99.5 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.10	Translation of Trademark License Agreement dated as of March 1, 2004 between Baidu Online and Baidu Netcom and the supplementary agreement dated as of January 18, 2005 (incorporated by reference to Exhibit 99.6 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.11	Translation of Domain Name License Agreement dated as of March 1, 2004 between Baidu Online and Baidu Netcom and the supplementary agreement dated August 9, 2004 (incorporated by reference to Exhibit 99.7 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.12	Translation of Web Layout Copyright License Agreement dated as of March 1, 2004 between Baidu Online and Baidu Netcom and the supplementary agreement dated as of August 9, 2004 (incorporated by reference to Exhibit 99.8 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.13	Translation of Proxy Agreement dated as of August 9, 2004 among Baidu Online, Baidu Netcom, Robin Yanhong Li and Eric Yong Xu (incorporated by reference to Exhibit 99.9 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.14	Translation of Equity Pledge Agreement dated as of March 22, 2005 among Baidu Online, Robin Yanhong Li and Eric Yong Xu (incorporated by reference to Exhibit 99.10 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.15	Translation of Exclusive Equity Purchase Option Agreement dated as of March 22, 2005 among Baidu Online, Robin Yanhong Li and Eric Yong Xu (incorporated by reference to Exhibit 99.11 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.16	Translation of Loan Agreement dated as of March 22, 2005 among Baidu Online, Robin Yanhong Li and Eric Yong Xu (incorporated by reference to Exhibit 99.12 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.17	Translation of Form of Irrevocable Powers of Attorney issued by the shareholders of Baidu Netcom (incorporated by reference to Exhibit 99.13 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
4.18	Translation of the form of Technology Consulting and Services Agreement between Baidu Online and a consolidated affiliated PRC entity (incorporated by reference to Exhibit 4.19 of our Annual Report on Form 20-F filed with the Securities and Exchange Commission on June 5, 2008)

4.19	Translation of the form of Operating Agreement between Baidu Online and a consolidated affiliated PRC entity (incorporated by reference to Exhibit 4.20 of our Annual Report on Form 20-F filed with the Securities and Exchange Commission on June 5, 2008)
4.20	Translation of the form of Web Layout Copyright License Agreement between Baidu Online and a consolidated affiliated PRC entity (incorporated by reference to Exhibit 4.21 of our Annual Report on Form 20-F filed with the Securities and Exchange Commission on June 5, 2008)

Exhibit Number	Description of Document
4.21	Translation of the form of Proxy Agreement among Baidu Online, a consolidated affiliated PRC entity and the shareholders of the consolidated affiliated PRC entity (incorporated by reference to Exhibit 4.22 of our Annual Report on Form 20-F filed with the Securities and Exchange Commission on June 5, 2008)
4.22	Translation of the form of Equity Pledge Agreement between Baidu Online and the shareholder of a consolidated affiliated PRC entity (incorporated by reference to Exhibit 4.23 of our Annual Report on Form 20-F filed with the Securities and Exchange Commission on June 5, 2008)
4.23	Translation of the form of Exclusive Equity Purchase Option Agreement between Baidu Online and the shareholder of a consolidated affiliated PRC entity (incorporated by reference to Exhibit 4.24 of our Annual Report on Form 20-F filed with the Securities and Exchange Commission on June 5, 2008)
4.24	Translation of the form of Loan Agreement between Baidu Online and the shareholder of a consolidated affiliated PRC entity (incorporated by reference to Exhibit 4.25 of our Annual Report on Form 20-F filed with the Securities and Exchange Commission on June 5, 2008)
4.25*	Translation of the Technology Consulting and Services Agreement dated as of June 23, 2006 between Baidu Online and Beijing Perusal
4.26*	Translation of the Operating Agreement dated as of June 23, 2006 between Baidu Online, Beijing Perusal, Jiping Liu and Yazhu Zhang and the supplementary agreement dated as of April 22, 2010
4.27*	Translation of the Webpage Layout Copyright License Agreement dated as of June 23, 2006 between Baidu Online and Beijing Perusal
4.28*	Translation of the Proxy Agreement dated as of June 23, 2006 among Jiping Liu, Yazhu Zhang and Baidu Online
4.29*	Translation of the Equity Pledge Agreements between Baidu Online and Jiping Liu, and between Baidu Online and Yazhu Zhang, both dated as of June 19, 2006
4.30*	Translation of the Exclusive Equity Purchase Option Agreements between Baidu Online, Jiping Liu and Beijing Perusal, and between Baidu Online, Yazhu Zhang and Beijing Perusal, both dated as of May 19, 2006, and supplemental agreements dated as of April 22, 2010
4.31*	Translation of Form of Irrevocable Powers of Attorney issued by Jiping Liu and Yazhu Zhang, the shareholders of Baidu Perusal, both dated June 23, 2006
4.32*	Translation of the Loan Agreements between Baidu Online and Jiping Liu and between Baidu Online and Yazhu Zhang, both dated as of May 19, 2006
4.33*	Translation of the Technology Consulting and Services Agreement dated as of February 28, 2008 between Baidu Online and BaiduPay and the supplementary agreement dated as of April 22, 2010

4.34*	Translation of the Operating Agreement dated as of February 28, 2008 between Baidu Online, BaiduPay, Jun Yu and Beijing Netcom and the supplementary agreement dated as of April 22, 2010
4.35*	Translation of the Webpage Layout Copyright License Agreement dated as of February 28, 2008 between Baidu Online and BaiduPay
4.36*	Translation of the Proxy Agreement between Hu Cai and Baidu Online, dated as of March 5, 2010
4.37*	Translation of the Equity Pledge Agreement between Baidu Online and Hu Cai, dated March 5, 2010
4.38*	Translation of the Exclusive Equity Purchase Option Agreement between Baidu Online, Hu Cai and BaiduPay dated as of March 5, 2010
4.39*	Translation of Form of Irrevocable Powers of Attorney issued by Hu Cai, the individual shareholder of BaiduPay, dated as of March 5, 2010

Table of Contents

Exhibit Number	Description of Document
4.40*	Translation of the Loan Agreement between Baidu Online and Hu Cai, dated March 5, 2010
4.41*	Translation of the Technology Consulting and Services Agreement dated as of December 28, 2010 between Baidu HR and Baidu Online
4.42*	Translation of the Operating Agreement dated as of December 28, 2010 between Baidu HR, Baidu Online and Yanhong Li
4.43*	Translation of the Proxy Agreement between Yanhong Li and Baidu Online, dated December 28, 2010
4.44*	Translation of the Equity Pledge Agreement between Yanhong Li and Baidu Online, dated December 28, 2010
4.45*	Translation of the Exclusive Equity Purchase Option Agreement between Baidu HR, Baidu Online and Yanhong Li, dated December 28, 2010
4.46*	Translation of the Loan Agreement between Baidu Online and Yanhong Li, dated December 28, 2010
4.47*	Translation of the Trademark Transfer Agreement between Baidu Online and Baidu Netcom, dated March 1, 2010
4.48*	Translation of the supplementary agreements, dated as of March 11, 2010 and April 22, 2010 to the Software License Agreement dated as of March 22, 2005 between Baidu Online and Baidu Netcom
4.49*	Translation of the supplementary agreements, dated March 1, 2010 and April 22, 2010 to the Trademark License Agreement dated as of March 1, 2004 between Baidu Online and Baidu Netcom and the supplementary agreement dated as of January 18, 2005
4.50*	Translation of the supplementary agreement dated as of March 1, 2010 to the Web Layout Copyright License Agreement dated as of March 1, 2004 between Baidu Online and Baidu Netcom and the supplementary agreement dated as of August 9, 2004
4.51*	Translation of the supplementary agreement dated April 22, 2010 to the Operating Agreement dated as of March 22, 2005 between Baidu Online and Baidu Netcom
4.52*	Translation of the supplementary agreement dated March 1, 2010 to the Domain Name License Agreement dated as of March 1, 2004 between Baidu Online and Baidu Netcom and the supplementary agreement dated August 9, 2004
4.53*	Translations of the supplementary agreement dated April 22, 2010 to the Exclusive Equity Purchase Option Agreement dated as of March 22, 2005 among Baidu Online, Robin Yanhong Li and Eric Yong Xu
4.54*	Translation of the Baidu Pay-for-Performance Distributors Management Agreement between Baidu Online and Baidu Netcom, dated as of December 22, 2010

8.1*	List of Subsidiaries and Consolidated Affiliated Entities
11.1	Code of Business Conduct and Ethics (incorporated by reference to Exhibit 99.14 of our Registration Statement on Form F-1 (file no. 333-126534) filed with the Securities and Exchange Commission on July 12, 2005)
12.1**	Certification by Principal Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
12.2**	Certification by Principal Financial Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
13.1*	Certification by Principal Executive Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
13.2*	Certification by Principal Financial Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002

Table of Contents

Exhibit Number	Description of Document
15.1*	Consent of Maples and Calder
15.2*	Consent of Han Kun Law Offices
15.3*	Consent of Ernst & Young Hua Ming
101.INS*	XBRL Instance Document
101.SCH*	XBRL Taxonomy Extension Schema Document
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF*	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB*	XBRL Taxonomy Extension Label Linkbase Document
101.PRE*	XBRL Taxonomy Extension Presentation Linkbase Document

* Previously filed with the Annual Report on Form 20-F on March 29, 2011.

** Filed with this Amendment No. 1 to Annual Report on Form 20-F.

Table of Contents

SIGNATURES

The registrant hereby certifies that it meets all of the requirements for filing its annual report on Form 20-F and that it has duly caused and authorized the undersigned to sign this Amendment No. 1 to its annual report on its behalf.

Baidu, Inc.

By: /s/ Robin Yanhong Li

Name: Robin Yanhong Li

Title: Chairman and Chief Executive Officer

Date: June 24, 2011

11

BAIDU, INC.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

Table of Contents

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Board of Directors and Shareholders

Baidu, Inc.

We have audited the accompanying consolidated balance sheets of Baidu, Inc. (the Company) as of December 31, 2010 and 2009, and the related consolidated statements of income, shareholders equity, and cash flows for each of the three years in the period ended December 31, 2010. These financial statements are the responsibility of the Company s management. Our responsibility is to express an opinion on these financial statements based on our 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 audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the consolidated financial position of Baidu, Inc. as of December 31, 2010 and 2009, and the consolidated results of its operations and its cash flows for each of the three years in the period ended December 31, 2010, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), Baidu, Inc. s internal control over financial reporting as of December 31, 2010, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated March 29, 2011 expressed an unqualified opinion thereon.

/s/ Ernst & Young Hua Ming

Beijing, The People s Republic of China
March 29, 2011

Table of Contents

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We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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 (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) 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 (3) 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.

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In our opinion, Baidu, Inc. maintained, in all material respects, effective internal control over financial reporting as of December 31, 2010, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the accompanying consolidated balance sheets of Baidu, Inc. as of December 31, 2010 and 2009, and the related consolidated statements of income, shareholders   equity, and cash flows for each of the three years in the period ended December 31, 2010 of Baidu, Inc., and our report dated March 29, 2011, expressed an unqualified opinion thereon.

/s/ Ernst & Young Hua Ming

Beijing, The People s Republic of China
March 29, 2011

Table of Contents

BAIDU, INC.

CONSOLIDATED BALANCE SHEETS
(Amounts in thousands of Renminbi (RMB), and in thousands of U.S. Dollars (US$), except for number of shares and per share data)

	Notes	December 31, 2009 RMB	2010 RMB	2010 US$
ASSETS				
Current assets:				
Cash and cash equivalents	2	4,180,376	7,781,976	1,179,087
Restricted cash	2	19,513	38,278	5,800

($ in millions)	2018	2017	2016
Capital expenditures for environmental control projects	$20	$7	$18

It is expected that expenditures for such projects in 2019 will be in the range of $25 million to $35 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.

Management believes that 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 14, "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.

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, the SEC’s or other 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 paints, coatings and specialty materials, 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 include both organic, primarily petroleum-derived, materials and inorganic materials, including titanium dioxide. These raw materials 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 2018, economic conditions improved in all of our major geographical regions while remaining mixed by end-use market. Demand for our products and services depends in part on the general economic conditions affecting the countries and markets in which we do business. Weak economic conditions in certain geographies and changing supply and demand balances in the markets we serve have negatively impacted demand for our products and services in the past and may do so in the future. Recently, global economic uncertainty has increased due to a number of factors, including slowing global growth, global stock and commodity market volatility, disruption in existing trade agreements, the imposition of tariffs and the threat of additional tariffs, the United Kingdom’s exit from the European Union, weaker demand in China and increasing interest rates in the United States. 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.

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.

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, securities 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 14, "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, and 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 or weakening of the U.S. dollar against major currencies, could adversely or positively affect our financial condition and results of operations expressed in U.S. dollars.

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

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, as well as interpretations by courts and regulators. These laws and regulations effectively expand our compliance obligations and 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.

Further, although we believe that we have appropriate risk management and compliance programs in place, we cannot guarantee that our internal controls and compliance systems will always protect us from improper acts committed by employees, agents, business partners or businesses that we acquire. Any non-compliance or such improper actions or allegations could damage our reputation and subject us to civil or criminal investigations and shareholder lawsuits, could lead to substantial civil and criminal, monetary and non-monetary penalties, and could cause us to incur significant legal and investigatory fees.

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 2018 by products sold outside the U.S. was approximately 62%.

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 changes. 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. Further, PPG may continue to refine its estimates to incorporate new or better information as it comes available. Recent developments, including 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.

Integrating acquired businesses into our existing operations.

Part of the Company’s strategy is growth through acquisitions. Over the last decade, we have successfully completed more than 50 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.

These risks or other problems encountered in connection with our past or future acquisitions and joint ventures could cause delays in realizing 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 and related automotive parts.

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.
We have concluded that previously issued financial statements as detailed below should not be relied upon and have restated those previously issued financial statements, which has led to, among other things, shareholder litigation, investigations by the SEC and the U.S. Attorney’s office and unanticipated costs for accounting and legal fees, and may result in certain other risks.
As discussed in the Explanatory Note, Note 2, “Restatement of Previously Reported Consolidated Annual Financial Statements” and in Note 19, “Quarterly Financial Information (unaudited)” under Item 8 of the 2017 Form 10-K/A, we have concluded that our previously issued financial statements as of December 31, 2017 and 2016, and for each of the quarterly and year-to-date periods in 2017, and the final quarterly and year-to-date period in 2016, should no longer be relied upon. The determination that the applicable financial statements should no longer be relied upon and that these financial statements would be restated was made following the identification of misstatements. Although the Company has restated these financial statements and the material weakness in the Company’s internal control over financial reporting has been remediated, as a result of these misstatements, we have become subject to a number of additional risks and uncertainties, including unanticipated costs for accounting and legal fees in connection with or related to the restatement, the outcome of our shareholder litigation and government investigations, potential loss of investor confidence, and a negative impact on our stock price. Our shareholder litigation and the government investigations could result in substantial defense costs regardless of the outcome of the litigation or investigation. If we do not prevail in any such litigation, we could be required to pay substantial damages or settlement costs.
We are involved in investigations by the SEC and the U.S. Attorney’s office which are costly to conduct and may result in substantial financial and other penalties, as well as adverse effects on our business and financial condition.
In connection with the Audit Committee’s review of alleged violations of our accounting policies and procedures, we self-reported this matter to the SEC. We are cooperating with the SEC and the U.S. Attorney’s office in their investigations of this matter. These investigations are continuing, and we are currently unable to predict their duration, scope or results or whether the SEC or U.S. Attorney will commence any legal action. If we are found to have violated securities laws or other federal statutes, we may be subject to criminal and civil penalties and other remedial measures, including, but not limited to, injunctive relief, disgorgement, civil and criminal fines and penalties, modifications of compliance programs and the retention of a monitor to oversee compliance. The imposition of any of these sanctions or remedial measures could have a material adverse impact on our business, reputation, revenues, results of operations and financial condition.
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 21, 2019, the Company operated 128 manufacturing facilities in 39 countries. See Item 1. “Business” of this

Form 10-K for the principal manufacturing and distribution facilities by reportable segment.

The Company has manufacturing facilities in the following geographic areas:

United States and Canada	EMEA	Asia Pacific	Latin America
34 facilities	54 facilities in 24 countries	26 facilities in 9 countries	14 facilities in 4 countries

The Company’s principal research and development centers are located in Allison Park, Pa.; Marly, France; Milan, Italy; Monroeville, Pa.; Burbank, Calif.; Tianjin, China; Amsterdam, Netherlands 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, securities and other matters arising out of the conduct of PPG’s current and past business activities. To the extent 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 Company has self-reported to the SEC information concerning the internal investigation of accounting matters described in the Explanatory Note and in Note 2, “Restatement of Previously Reported Consolidated Annual Financial Statements” under Item 8 of the 2017 Form 10-K/A. The Company continues to cooperate fully with the SEC’s ongoing investigation relating to these accounting matters. The Company is also cooperating fully with an investigation into the same accounting matters commenced by the U.S. Attorney’s Office for the Western District of Pennsylvania.

On May 20, 2018, a putative securities class action lawsuit was filed in the U.S. District Court for the Central District of California against the Company and certain of its current or former officers. On September 21, 2018, an Amended Class Action Complaint was filed in the action. The Amended Complaint, captioned Trevor Mild v. PPG Industries, Inc., Michael H. McGarry, Vincent J. Morales, and Mark C. Kelly, asserts securities fraud claims under Sections 10(b) and 20(a) of the Securities Exchange Act of 1934 on behalf of putative classes of persons who purchased or otherwise acquired stock of the Company during various time periods between January 19, 2017 and May 10, 2018. The allegations relate to, among other things, allegedly false and misleading statements and/or failures to disclose information about the Company’s business, operations and prospects. On December 21, 2018, the Court denied the defendants’ motion to dismiss the lawsuit, and on January 4, 2019 the defendants filed answers to the Amended Complaint. This action remains pending. The Company believes this action is without merit and intends to defend itself vigorously.

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 14, “Commitments and Contingent Liabilities” to the accompanying consolidated financial statements under Part I, 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. After having not been named in a new lead-related lawsuit for 15 years, PPG was named as a defendant in two new Pennsylvania state court lawsuits filed by Montgomery County and Lehigh County in the respective counties on October 4, 2018 and October 12, 2018. Both suits seek declaratory relief arising out of alleged public nuisances in the counties associated with the presence of lead paint on various buildings constructed prior to 1980. The Company believes these actions are without merit and intends to defend itself vigorously.

Executive Officers of the Company

Set forth below is information related to the Company's executive officers as of February 21, 2019.

Name	Age	Title
Michael H. McGarry [a]	60	Chairman and Chief Executive Officer since September 2016
Anne M. Foulkes [b]	56	Senior Vice President and General Counsel since September 2018
Vincent J. Morales [c]	53	Senior Vice President and Chief Financial Officer since March 2017
Amy R. Ericson [d]	53	Senior Vice President, Packaging Coatings since July 2018
Timothy M. Knavish [e]	53	Senior Vice President, Architectural Coatings and President PPG EMEA since January 2019
Rebecca B. Liebert [f]	51	Senior Vice President, Automotive Coatings since June 2018
Ramaparasad Vadlamannati [g]	56	Senior Vice President, Protective and Marine Coatings since March 2016

(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) Ms. Foulkes served as Senior Vice President, General Counsel and Secretary from August 2018 through September 2018, Vice President and Associate General Counsel and Secretary from March 2016 through July 2018 and Assistant General Counsel and Secretary from April 2011 through February 2016.

(c) Mr. Morales served as Vice President, Finance from June 2016 through February 2017. From June 2015 through June 2016, he served as Vice President, Investor Relations and Treasurer and from October 2007 through May 2015 he served as Vice President, Investor Relations.

(d) Ms. Ericson was appointed Senior Vice President, Packaging Coatings in July 2018 when she joined PPG from SUEZ SA. She previously served as President of SUEZ Chemical Monitoring and Solutions from 2017 until 2018, President of General Electric Water Services Company from 2015 to 2017 and President and Chief Executive Officer of Alstom SA's U.S. business from 2013 to 2015.

(e) Mr. Knavish served as Senior Vice President, Industrial Coatings from October 2017 to January 2019, Senior Vice President, Automotive Coatings from March 2016 through September 2017, Vice President, Protective and Marine Coatings from August 2012 through February 2016 and Vice President, Automotive Coatings, Americas from March 2010 through July 2012.

(f) Ms. Liebert was appointed Senior Vice President, Automotive Coatings in June 2018 when she joined PPG from Honeywell International, Inc. She previously served as President and Chief Executive Officer of Honeywell UOP from 2016 to 2018, Senior Vice President and General Manager, Catalyst Adsorbents and Specialties of Honeywell UOP from 2015 to 2016 and Senior Vice President and General Manager, Gas Processing and Hydrogen of Honeywell UOP from 2012 to 2015.

(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.

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 PPG's stock exchange listing 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. Annual information is also included in the 2018 Financial Overview and Shareholder Information on page 10 of the Annual Report to shareholders.

Issuer Purchases of Equity Securities - Fourth Quarter 2018

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)
October 2018				
Repurchase program	2,217,910	$101.80	2,217,910	19,202,867
November 2018				
Repurchase program	—	$—	—	18,458,147
December 2018				
Repurchase program	1,855,100	$98.45	1,855,100	17,953,509
Total quarter ended December 31, 2018				
Repurchase program	4,073,010	$100.28	4,073,010	17,953,509

(1) In December 2017, PPG's board of directors approved a $2.5 billion share repurchase program. The remaining shares yet to be purchased under the program has 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 2018.

Item 6. Selected Financial Data

The information required by Item 6 regarding the selected financial data for the five years ended December 31, 2018 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 104 of the Annual Report to shareholders.

Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations
Performance Overview
Net Sales by Region

($ in millions, except percentages)	2018	2017	2016	% Change 2018 vs. 2017	2017 vs. 2016
United States and Canada	$6,485	$6,307	$6,254	2.8%	0.8%
Europe, Middle East and Africa (EMEA)	4,678	4,389	4,164	6.6%	5.4%
Asia Pacific	2,618	2,523	2,431	3.8%	3.8%
Latin America	1,593	1,529	1,421	4.2%	7.6%
Total	$15,374	$14,748	$14,270	4.2%	3.3%

2018 vs. 2017
Net sales increased $626 million due to the following:
- Higher selling prices (+2%)
- Slightly higher acquisition-related sales, net of dispositions
- Slightly higher sales volumes
- Slightly favorable foreign currency translation

U.S. and Canada net sales increased a low-single-digit percentage primarily driven by net sales from acquired businesses which added approximately $110 million, primarily from The Crown Group, as well as higher selling prices in most businesses.
Europe, Middle East and Africa (EMEA) net sales increased a mid-single-digit percentage, led by slightly positive sales volumes, higher selling prices in all businesses and favorable foreign currency translation driven by the euro and U.K. pound.
Asia Pacific net sales increased by a mid-single-digit percentage aided by higher selling prices in most businesses and higher sales volumes, slightly offset by weakening industry demand in China later in the year. Sales growth was also supported by a more than 10% increase in India and solid gains in Australia and Southeast Asia. Net sales in this region also benefited from favorable foreign currency translation.
Latin American net sales volumes grew by a mid-single-digit percentage versus the prior year. Sales also benefited from higher selling prices in the region, offset by unfavorable foreign currency translation driven by the Mexican peso.
For specific business results see the Segment Results section within Item 7 of this Form 10-K.
2017 vs. 2016
Net sales increased $478 million due to the following:
- Acquisition-related sales (+1%)
- Higher sales volumes (+1%)
- Slightly favorable foreign currency translation
- Slightly higher selling prices

Net sales from acquired businesses added over $200 million of sales in 2017, primarily MetoKote, DEUTEK, Univer and The Crown Group.
U.S. and Canada sales volumes declined slightly year-over-year, with mixed demand by business and end-use segment. Sales volumes in architectural coatings U.S. company-owned stores grew by a mid-single-digit percentage, but were more than offset by sales volumes declines in the independent dealer networks and national retail (DIY) customer accounts in aggregate. Automotive OEM coatings sales volumes declined year-over-year and lagged industry demand levels due to a customer-driven share shift away from PPG that was offset in other regions of the world. These decreases in sales volumes were partially offset by higher sales volumes in specialty coatings and materials, automotive refinish coatings, general industrial coatings, aerospace coatings and packaging coatings.
EMEA sales volumes increased a low-single-digit percentage versus the prior year. Sales volumes in our automotive OEM coatings and aerospace coatings businesses each grew by a mid-single-digit percentage. Specialty coatings and materials sales volumes grew by a double-digit percentage, driven by strong silica demand. Protective coatings volumes also grew year-over-year. These increases in sales volumes were partially offset by lower demand in architectural coatings.

Asia Pacific sales volumes expanded by a mid-single-digit percentage year-over-year led by growth in each business within the Industrial Coatings segment along with sales volume growth in the architectural coatings business. These increases in sales volumes were partially offset by lower demand in marine coatings year-over-year. From a country and sub-region perspective, sales volumes grew in India, China, and Southeast Asia versus the prior year. Korea sales volumes continued to decline year-over-year primarily due to continued weakness in new shipbuilding.

Latin America sales volumes expanded by a mid-single-digit percentage versus the prior year primarily due to above market growth in our automotive OEM coatings and general industrial coatings businesses. The automotive OEM coatings growth was driven by industry production expansion with the opening of new assembly facilities in Mexico. Regional sales volumes were lower in architectural coatings versus the prior year primarily due to lower sales volumes in Brazil and in Mexico due to the impact of the natural disasters during the third quarter.

Cost of sales, exclusive of depreciation and amortization

				% Change	
($ in millions, except percentages)	2018	2017	2016	2018 vs. 2017	2017 vs. 2016
Cost of sales, exclusive of depreciation and amortization	$9,001	$8,209	$7,665	9.6%	7.1%
Cost of sales as a % of net sales	58.5 %	55.7 %	53.7 %	2.8%	2.0%

2018 vs. 2017

Cost of sales, exclusive of depreciation and amortization, increased $792 million due to the following:

Raw material cost inflation

Higher sales volumes

Cost reclassifications associated with the adoption of the new revenue recognition standard. Refer to Note 2, "Revenue Recognition" within Part 2 of this Form 10-K

Cost of sales attributable to acquired businesses

Foreign currency translation

Partially offset by:

Restructuring cost savings

2017 vs. 2016

Cost of sales, exclusive of depreciation and amortization, increased $544 million due to the following:

Raw material cost inflation

Higher sales volumes

Cost of sales attributable to acquired businesses

Foreign currency translation

Partially offset by:

Lower manufacturing costs

Selling, general and administrative expenses

				% Change	
($ in millions, except percentages)	2018	2017	2016	2018 vs. 2017	2017 vs. 2016
Selling, general and administrative expenses	$3,573	$3,554	$3,555	0.5%	—%
Selling, general and administrative expenses as a % of net sales	23.2 %	24.1 %	24.9 %	(0.9)%	(0.8)%

2018 vs. 2017

Selling, general and administrative expenses declined as a percent of net sales, but increased $19 million primarily due to:

Higher sales volumes

Wage and other cost inflation

Selling, general and administrative expenses from acquired businesses

Foreign currency translation
Partially offset by:
Cost reclassifications associated with the adoption of the new revenue recognition standard. Refer to Note 2, "Revenue Recognition" within Part 2 of this Form 10-K
Cost management including restructuring cost savings
2017 vs. 2016
Selling, general and administrative expenses decreased $1 million primarily due to:
Lower net periodic pension and other postretirement benefit costs
Lower selling and advertising costs
Restructuring cost savings
Partially offset by:
Wage and other cost inflation
Selling, general and administrative expenses from acquired businesses
Foreign currency translation
Other charges and other income

				% Change	
($ in millions, except percentages)	2018	2017	2016	2018 vs. 2017	2017 vs. 2016
Interest expense, net of Interest income	$95	$85	$99	11.8%	(14.1)%
Business restructuring, net	$66	$—	$191	N/A	(100.0)%
Pension settlement charges	$—	$60	$968	(100.0)%	(93.8)%
Other charges	$122	$74	$242	64.9%	(69.4)%
Other income	($114)	($150)	($127)	(24.0)%	18.1%

Interest expense, net of Interest income
Interest expense, net of Interest income increased $10 million in 2018 versus 2017 primarily due to the issuance of long-term debt in early 2018. Interest expense, net of Interest income decreased $14 million in 2017 versus 2016 due to lower interest rate debt outstanding in 2017.
Business restructuring, net
A pretax restructuring charge of $83 million was recorded in the second quarter of 2018, offset by certain changes in estimates to complete previously recorded programs of $17 million. A pretax charge of $191 million was recorded in 2016. Refer to Note 8, "Business Restructuring" in Item 8 of this Form 10-K for additional information.
Pension settlement charges
During 2017, PPG made lump-sum payments to certain retirees who had participated in PPG's U.S. qualified and non-qualified pension plans totaling approximately $127 million. As the lump-sum payments were in excess of the expected 2017 service and interest costs for the affected plans, PPG remeasured the periodic benefit obligation of these plans in the period payments were made and recorded settlement charges totaling $60 million ($38 million after-tax) during 2017.
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 13, "Employee Benefit Plans" in Item 8 of this Form 10-K for additional information.
Other charges
Other charges in 2018 and 2016 were higher than 2017 primarily due to environmental remediation charges. These charges were principally for environmental remediation at a former chromium manufacturing plant and associated sites in New Jersey. Refer to Note 14, "Commitments and Contingent Liabilities" in Item 8 of this Form 10-K for additional information.
Other income
Other income was lower in 2018 and 2016 than in 2017 primarily due to the gain from the sale of the Mexican Plaka business of $25 million and income from a legal settlement of $18 million in 2017. Refer to Note 3, "Acquisitions and Divestitures" in Item 8 of this Form 10-K for additional information.

Effective tax rate and earnings per diluted share, continuing operations

($ in millions, except percentages)	2018	2017	2016	% Change 2018 vs. 2017	2017 vs. 2016
Income tax expense	$353	$615	$214	(42.6)%	187.4%
Effective tax rate	20.9 %	30.7 %	27.5 %	(9.8)%	3.2%
Adjusted effective tax rate*	22.1 %	24.3 %	24.5 %	(2.2)%	(0.2)%
Earnings per diluted share	$5.40	$5.31	$2.04	1.7%	160.3%
Adjusted earnings per diluted share*	$5.92	$5.86	$5.64	1.0%	3.9%

*See the Regulation G reconciliations - results of operations

The effective tax rate for the year-ended December 31, 2018 was 20.9% and decreased 9.8% from the prior year. In 2017, the tax rate included the tax toll charge for unremitted foreign earnings under the U.S. Tax Cuts and Jobs Act, while in 2018, the tax rate benefited from prior period adjustments, including finalization of the provisional toll charge recorded in 2017. The 2019 effective tax rate from continuing operations is expected to be in the range of 23% to 25%.

As reported, earnings per diluted share from continuing operations for the year ended December 31, 2018 increased year-over-year. 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 benefited from the 15.9 million, 7.4 million and 10.7 million shares of stock repurchased in 2018, 2017 and 2016, respectively, in conjunction with the Company’s cash deployment objectives.

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 from continuing operations 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, 2018

($ 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	$1,693	$353	20.9 %	$1,323	$5.40
Includes:					
Net tax charge related to U.S. Tax Cuts and Jobs Act	—	13	N/A	(13)	(0.05)
Charges related to customer assortment change	18	4	24.3 %	14	0.05
Charges related to environmental remediation and other costs	77	19	24.3 %	58	0.24
Net charge related to business restructuring	66	20	30.3 %	46	0.18
Accelerated depreciation from restructuring actions	9	2	22.2 %	7	0.03

Charge related to a legacy legal settlement	10	2	24.3 %	8	0.03
Charges related to accounting investigation costs	14	3	24.3 %	11	0.05
Charges related to transaction-related costs[(1)]	6	2	25.5 %	4	0.02
Charge related to brand rationalization	6	2	26.8 %	4	0.02
Gain from the sale of a non-operating asset	(26)	(6)	24.3 %	(20)	(0.08)
Charge related to impairment of a non-manufacturing asset	9	2	24.3 %	7	0.03
Adjusted, continuing operations, excluding certain items	$1,882	$416	22.1 %	$1,449	$5.92

Year-ended December 31, 2017

($ 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	$2,005	$615	30.7 %	$1,369	$5.31
Includes:					
Net tax charge related to U.S. Tax Cuts and Jobs Act	—	(134)	N/A	134	0.52
Charges related to transaction-related costs[1]	9	3	37.9 %	6	0.02
Charges related to pension settlements	60	22	37.9 %	38	0.14
Gain from sale of business	(25)	(1)	3.2 %	(24)	(0.09)
Gain from a legacy legal settlement	(18)	(7)	37.9 %	(11)	(0.04)
Gain from sale of a non-operating asset	(13)	(5)	37.9 %	(8)	(0.03)
Charges related to asset write-downs	7	—	— %	7	0.03
Adjusted, continuing operations, excluding certain items	$2,025	$493	24.3 %	$1,511	$5.86

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	$779	$214	27.5 %	$543	$2.04
Includes:					
Charges related to transaction-related costs[1]	8	3	37.6 %	5	0.03
Charge related to pension settlement	968	352	36.4 %	616	2.31
Charge related to business restructuring	191	50	26.2 %	141	0.53
Charge related to environmental remediation	82	31	37.6 %	51	0.20
Net gain from disposals of ownership interests in business affiliates	(46)	(16)	34.8 %	(30)	(0.12)
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	23	7	30.4 %	17	0.06
Adjusted, continuing operations, excluding certain items	$2,013	$493	24.5 %	$1,499	$5.64

(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 certain acquisitions.

Performance of Reportable Business Segments
Performance Coatings

($ in millions, except percentages)	2018	2017	2016	$ Change 2018 vs. 2017	2017 vs. 2016	% Change 2018 vs. 2017	2017 vs. 2016
Net sales	$9,087	$8,730	$8,580	$357	$150	4.1%	1.7%
Segment income	$1,300	$1,313	$1,322	($13)	($9)	(1.0)%	(0.7)%

2018 vs. 2017
Performance Coatings net sales increased (4%) due to the following:
Higher selling prices (+3%)
Favorable foreign currency translation (+1%)
Higher selling prices across all businesses were achieved, reflecting the value of our products and services and which offset persistent raw material and logistics cost inflation.
Architectural coatings - Americas and Asia-Pacific sales volumes decreased by a low-single-digit percentage versus the prior year. Sales volumes were positive year-over-year in the U.S. and Canada company-owned store network as well as in Mexico, Central America, Australia and Brazil. This growth was more than offset by lower DIY and independent dealer network channel declines, including the unfavorable impact from a customer assortment change in the U.S. architectural DIY channel. In February 2018, PPG announced that Lowe’s would discontinue the sale of OLYMPIC® brand paints and stains in its U.S. retail stores, effective mid-2018. During the second quarter 2018, the Company launched its OLYMPIC® stain products at THE HOME DEPOT®’s U.S. retail stores, expanding an existing partnership arrangement. The net impact of these customer assortment changes resulted in net sales being lower by approximately $100 million in 2018.
Architectural coatings - EMEA net sales grew by a mid-single digit percentage. Higher selling prices and acquisition-related sales more than offset modestly lower sales volumes. Sales volumes grew in countries in Northern and Eastern Europe and were lower in Southern Europe.
Automotive refinish coatings organic sales grew by a low-single-digit percentage year-over-year, despite lower demand in the U.S. due to customer inventory destocking and lower industry collision claim activity. Organic sales increased in all other geographic regions as customers continued to adopt PPG’s industry leading technologies.
Aerospace coatings sales volumes grew by more than 10 percent versus the prior year, including above-market volume growth in the U.S. and Asia. Strong growth was supported by positive industry demand fundamentals and market outperformance in all major platforms stemming from technology advantaged products.
Protective and marine coatings sales volumes increased by a high-single-digit percentage year-over-year. Protective coatings sales volumes were up a mid-single-digit percentage, driven by growth in China. Marine coatings sales volumes grew by more than 10 percent off a low sales base as ship building activity grew modestly in Asia.
Segment income decreased $13 million year-over-year primarily driven by increasing raw material and logistics costs. These cost increases were partially offset by higher selling prices and additional benefits from the Company’s restructuring programs. Favorable foreign currency translation increased segment income by approximately $15 million, primarily related to the strengthening of the euro.
2017 vs. 2016
Performance Coatings net sales increased (2%) due to the following:
Higher selling prices (+1%)
Net sales from acquisitions (+1%)
Modest foreign currency translation
Partially offset by:
Slightly lower sales volumes
Selling prices increased year-over-year primarily due to selling price initiatives across all businesses to combat accelerating raw material cost inflation.
Architectural coatings - Americas and Asia Pacific sales volumes declined a low-single-digit-percentage versus the prior year. Sales volumes increased by a mid-single-digit percentage in company-owned stores in the U.S. and Canada, including

the unfavorable impact from natural disasters in the third quarter 2017. This increase was more than offset by sales volume declines in the U.S. and Canada independent dealer networks and national retail (DIY) customer accounts, as both distribution channels continued to experience soft demand. Organic sales improved in both the Latin America and Asia Pacific regions.

Architectural coatings - EMEA net sales increased by a high-single-digit percentage year-over-year, primarily due to acquisition-related sales, principally DEUTEK and Univer, which contributed approximately $85 million to net sales. Sales volumes were down year-over-year primarily driven by continued weak demand in France and eastern Europe, as well as our turning away certain business due to low profitability or lack of customer acceptance of selling price increases. Demand growth continued in Northern Europe, where we continued to outperform the market.

Automotive refinish coatings organic sales grew by a low-single-digit percentage year-over-year, led by above-market performance in U.S. and Canada as customers continued to adopt PPG’s industry leading technologies. Organic sales also increased in the Latin American region versus the prior year, reflecting high end-use market demand. In Asia Pacific, net sales increased, largely due to the recent Futian Xinshi acquisition in China.

Aerospace coatings sales volumes grew by a low-single-digit percentage versus the prior year, led by above market performance in Europe and consistent with the overall industry demand.

Protective and marine coatings sales volumes declined by a mid-single-digit percentage year-over-year. Protective coatings sales volumes expanded in most regions, led by Europe, but were more than offset by significant weakness in new shipbuilding activity, primarily in the Asia Pacific region.

Segment income decreased $9 million year-over-year primarily due increasing raw material costs, wage and other cost inflation, and lower sales volumes partially offset by selling price increases, lower overhead and manufacturing costs, including the initial benefits from business restructuring actions.

Looking Ahead

Looking ahead, year-over-year raw material cost inflation is expected in the first half of 2019, primarily due to carry-over inflation. Acquisition related sales are forecast to add a low-single-digit percentage of sales growth primarily from the SEM acquisition and based on current exchange rates, we expect foreign currency translation to have an unfavorable impact on segment sales of approximately $100 million in the first quarter.

Additionally, further selling price increases are expected in 2019 as we continue to offset the cumulative impact of raw material inflation over the past nine quarters. Net sales are expected to be lower in the first half compared to 2018 driven by lower U.S. DIY sales of approximately $110 million due to the customer assortment changes that occurred in 2018. The impact will be larger than the impact realized in the fourth quarter of 2018 due to the seasonality of the U.S. DIY business.

Industrial Coatings

($ in millions, except percentages)	2018	2017	2016	$ Change 2018 vs. 2017	$ Change 2017 vs. 2016	% Change 2018 vs. 2017	% Change 2017 vs. 2016
Net sales	$6,287	$6,018	$5,690	$269	$328	4.5%	5.8%
Segment income	$818	$979	$1,060	($161)	($81)	(16.4)%	(7.6)%

2018 vs. 2017

Industrial Coatings segment net sales increased (5%) due to the following:

- Acquisition-related sales (+1.5%)
- Higher selling prices (+1.5%)
- Higher sales volumes (+1%)

Selling prices increased sequentially throughout the year and were up approximately 1.5 percent year-over-year primarily driven by the general industrial and packaging businesses.

Industrial coatings sales volumes continued to grow led by strong outperformance in coil, heavy-duty equipment and electronics materials. From a geographic perspective, sales volume growth was led by EMEA and Latin America. Acquisition-related sales from The Crown Group added approximately $100 million in sales during the year.

Packaging coatings sales volumes were up a mid-single-digit percentage year-over-year driven by continued customer adoption of PPG's new can coating technologies. From a geographic perspective, sales volumes in the developed regions grew a high-single-digit percentage, offset by a low-single-digit percentage decrease in the Asia Pacific region.

PPG’s automotive OEM coatings sales volumes were slightly lower versus the prior year, consistent with the global automotive industry growth rate. In the second half of the year, automotive OEM production fell sharply in China and new emission standards negatively impacted production in Europe.

Specialty coatings and materials net sales increased by a low-single-digit percentage due to higher selling prices and higher sales volumes in EMEA.

Segment income decreased $161 million year-over-year primarily due to continuing, significant raw material and logistics cost inflation, partially offset by higher selling prices and lower manufacturing costs, including benefits from business restructuring actions. Favorable foreign currency translation added approximately $5 million to segment income.

2017 vs. 2016

Industrial Coatings segment net sales increased (6%) due to the following:

- Higher sales volumes (+4%)
- Acquisition-related sales (+3%)

Partially offset by:

- Lower selling prices (1%)

PPG’s automotive OEM coatings sales volumes increased by a low-single-digit percentage versus the prior year, consistent with the global automotive industry production growth rate, led by China, Mexico, Europe and Brazil. Sales volumes declined in the U.S. and Canada, partially reflecting fewer automotive new builds.

General industrial coatings and specialty coatings and materials sales volumes, in aggregate, grew by a mid-single-digit percentage year-over-year. Sales volumes grew year-over-year in every major region with mixed demand by end-use and geography. This growth was led by Asia Pacific and the U.S., which outpaced regional industrial production demand growth. Sales volumes grew across most segments, including year-over-year increases in electronics materials, heavy duty equipment and organic light emitting diode (OLED) materials. Acquisition-related sales, primarily MetoKote, added approximately $155 million.

Packaging coatings sales volumes grew by a mid-single-digit percentage year-over-year, primarily driven by ongoing industry conversions to PPG’s new can coatings technologies, led by the U.S.

Segment income decreased $81 million year-over-year primarily due to increasing raw material costs, lower selling prices and wage and other cost inflation. These cost increases were partially offset by income from higher sales volumes, lower manufacturing and overhead costs, including the initial benefits from business restructuring actions, and acquisition-related income.

Looking ahead

Looking ahead, we expect that greater volatility in global industrial demand will continue through the first quarter of 2019 with inconsistencies by region. The carryover impact from 2018 cost inflation and significantly unfavorable foreign currency translation will impact first quarter earnings. The Company will continue to prioritize implementing selling price increases and operating margin recovery.

Global automotive OEM industry demand is expected to remain soft in the first quarter for most major regions with greater volatility expected in China. We anticipate that aggregate global general industrial demand growth will continue, but at a more moderate rate than in the first quarter of 2019. In addition, we expect that the Whitford acquisition will close during the latter portion of the first quarter, pending required regulatory approvals, and therefore will not provide meaningful sales or earnings benefit in the quarter. In addition, we expect packaging sales volumes to moderate as the pace of technology conversions slow in 2019.

Review and Outlook

During 2018, economic conditions were generally positive in all of our major geographical regions while remaining mixed by end-uses. PPG's aggregate organic sales grew approximately 3% versus the prior year. Acquisition-related sales from two acquisitions completed in 2017 and the four completed in 2018 contributed approximately 1% to net sales growth year-over-year, net of dispositions. Foreign currency translation was favorable for the first half of the year then turned unfavorable in the second half of the year. For the full year 2018, foreign currency translation favorably impacted sales by approximately 1%. Raw material inflation was elevated throughout the year and overall rose a mid-single digit percentage driven by supply related factors, including government mandated production curtailments in China to help improve pollution and higher oil prices. In addition, logistics costs were significantly higher in 2018 driven by higher oil prices and shortages in the availability in transportation.

U.S. and Canada

During 2018, the pace of economic activity improved in the U.S. and Canada region versus the prior year, led by stronger GDP growth in the U.S. despite flat automotive industry builds. Demand in the residential and commercial construction markets was modestly higher in 2018 compared to 2017. New home starts advanced approximately 4% in 2018 versus approximately 3% in 2017. Residential remodeling was flat in 2018 versus 2017, while commercial construction was flat compared to a 1% decline in 2017. Market demand for architectural paint continued to shift more to the professional trade painters channel as the continued decline in U.S. unemployment resulted in consumers choosing professional painters rather than completing projects themselves. Demand in U.S. do-it-yourself (DIY) paint stores continued to remain soft throughout the year consistent with 2017. PPG's architectural coatings performance in the U.S. and Canada was impacted by DIY customer assortment changes that unfavorably impacted sales by approximately $100 million. The automotive refinish coatings business was impacted by lower collision rates and a higher number of automobiles in accidents being totaled rather than repainted offsetting modest growth in miles driven. PPG's packaging coatings business continued to expand well ahead of the industry driven by continued strong sales growth momentum related to customer adoption of PPG's new interior can coatings technologies. PPG's automotive OEM coatings business performance was slightly better than industry demand levels due to modest share gains. The U.S. and Canada region remained PPG's largest, representing approximately 42% of 2018 sales, although a smaller percentage of total sales than in the prior year.

Europe, Middle East and Africa

European economic activity was mixed in 2018. Industrial production was higher in the first half of the year and moderated as the year progressed. The region was impacted by continuing uncertainty over the United Kingdom's exit from the European Union. Overall GDP and industrial production were similar to 2017 in the region. Regional demand continued to be mixed by country and end-uses. Demand for PPG's products in several end-uses drove the regional growth rate, including above market performance in general industrial coatings, packaging coatings and specialty coatings and materials. PPG's architectural coatings - EMEA business sales volumes decreased year-over-year, driven by soft demand in Southern Europe.

EMEA represented approximately 30% of PPG's 2018 sales, similar to prior year levels. Regional coatings volumes remain approximately 15% below their pre-recession levels in 2008. The modest volume recovery reflects the slow pace of economic growth in the region. PPG expects modest volume growth over time at attractive incremental margins due to significant cost structure improvements and available capacity to satisfy additional demand. In the second half of the year, the euro and British pound both depreciated against the U.S. dollar.

Asia Pacific and Latin America

The emerging regions of Asia Pacific and Latin America represented 28% of PPG's 2018 sales in aggregate, similar to the prior year.

Asia remained the largest emerging region, with sales of approximately $2.5 billion, led by China, which continued as PPG's second largest country by revenue. The Performance Coatings segment led sales volume growth in Asia, in part due to strong sales volume growth in protective and marine coatings, aerospace coatings, and automotive refinish coatings. These increases were partially offset by a decline in automotive OEM coatings, particularly in China where industry retail automobile sales fell for the first time in over 25 years.

Overall, demand in Latin America improved year-over-year for the second consecutive year, with continued above market growth in Mexico and Central America. Economic conditions were mixed in South America, and there was heightened currency volatility throughout the entire region. In Mexico, the PPG-Comex business added over 200 new concessionaire locations. The overall region's performance was supported by strong growth in the general industrial and packaging coatings businesses. Foreign currency translation was volatile and finished 4 percent unfavorable compared to 2017, principally the Mexican peso and Brazilian real.

Outlook

Looking ahead to 2019, we expect global market growth to continue, but we expect a downshift in the pace of growth, and it will likely be uneven by region and end-use. We expect most regional growth rates to be modestly lower than 2018, but the Latin America region growth rate to be slightly higher.

We anticipate PPG's U.S. and Canada regional growth will be led by general industrial coatings and aerospace coatings, with flat automotive industry builds. We expect growth in housing and commercial construction to be comparable to 2018.

We expect demand in Europe to grow but at lower levels than 2018. Regional growth is expected to remain mixed by sub-region and country. Favorable end-use trends are expected to continue in general industrial and packaging with flattening demand in automotive OEM coatings as industry growth rates are anticipated to be flat. Demand is expected to stay subdued in the architectural coatings business. We continue to monitor the economic environment in the U.K. as their exit from the European Union progresses and impacts consumer sentiment and coatings demand.

In Asia Pacific, we expect continued industrial production growth in China, Southeast Asia and India. In China, we foresee continued above global average growth with heightened risk as the Chinese economy continues to shift and rely more on domestic consumption. The sharp decline in automotive OEM activity seen in the second half of 2018 is expected to continue in the beginning of 2019. We expect year-over-year demand patterns to become more favorable in the second half of 2019. The recovery in marine coatings demand is expected to continue, albeit off a low base.

In Latin America, we anticipate economic expansion will continue in Mexico, most of Central America and South America.

Significant other factors

In May 2018, PPG initiated an $83 million global restructuring program. The program is largely centered around the change in customer assortment related to the U.S. architectural coatings DIY business. PPG recognized $18 million of savings from this program in 2018.

Significant progress was made on the global restructuring program that was announced in December 2016. This program targeted annual savings of approximately $125 million once fully implemented. The Company achieved approximately $60 million of savings in 2018 bringing the total savings to approximately $110 million to date.

We expect to achieve the full-annualized target of $125 million in 2019. We will continue to aggressively manage the Company's cost structure to ensure alignment with the overall demand environment, and we will make adjustments as required to remain competitive in the marketplace. Restructuring savings from the 2018 and 2016 programs are expected to be between $60 million and $70 million in 2019.

Raw materials are a significant input cost to the process of manufacturing coatings. PPG experiences fluctuating energy and raw material costs 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 higher by a mid-single-digit percentage in 2018 versus 2017 due to variety of reasons, including supplier force majeure, environmental regulation enforcement, and higher crude oil prices. PPG currently expects overall coatings raw material prices to increase a low-single-digit percentage in the first half of 2019, with impacts varied by region and commodity, marking the tenth and eleventh consecutive quarters of inflation. In addition, logistics costs were inflated throughout the year driven by higher crude oil prices and availability of transportation. Logistics costs are expected to further increase in 2019.

In 2018, we achieved broad selling price improvement, reflecting the Company's efforts to offset higher raw material costs. Further benefits from selling price actions are necessary in 2019 to recover profit contribution margins. The Company will carefully monitor raw material costs during 2019 and assess the need for additional increases to selling prices for increases in these costs.

Pension and postretirement benefit costs, excluding settlements, curtailments and special termination benefits, totaled approximately $30 million in 2018, down approximately $20 million from 2017. In 2019, we expect pension and other postretirement benefit costs will be approximately $30 million, similar to 2018.

PPG contributed $75 million to its U.S. defined benefit pension plans in 2018 and $54 million in 2017. In 2018, the Company made contributions aggregating $24 million to its non-U.S. defined benefit pension plans. In 2019, mandatory contributions to PPG's non-U.S. defined benefit pension plans are expected to be between $20 million and $30 million.

In 2018, favorable foreign currency translation experienced in the first half of the year was mostly offset by unfavorable foreign currency translation experienced in the second half of the year. Based on mid-January 2019 exchange rates, the Company expects year-over-year unfavorable foreign currency translation to decrease 2019 sales by $400 million to $500 million and 2019 income before income taxes by $50 million to $70 million. We expect the foreign currency translation impact to be more prevalent during the first half of 2019 due to prior year foreign exchange rate trends. The foreign currency environment continues to be volatile, and the impact on 2019 net sales and income before income taxes could differ from this estimate. 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 related impacts.

The 2019 effective tax rate from continuing operations is expected to be in the range of 23% to 25%. This range represents the Company's best estimate, including updated guidance for the 2017 the U.S. Tax Cuts and Jobs Act.

Over the past five years, the Company used over $5 billion of cash to repurchase approximately 50 million shares of PPG stock, including approximately $1.7 billion in 2018. The Company ended the year with approximately $1.8 billion remaining under its current share repurchase authorization. During 2018, the Company deployed approximately $380 million for acquisitions and $450 million for dividends. PPG increased its per-share dividend in October 2018, marking the 47th annual per share dividend increase and the 119th consecutive year of annual dividend payments.

PPG ended 2018 with approximately $1 billion in cash and short-term investments. The Company expects continued strong cash generation in 2019.

Accounting Standards Adopted in 2018

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, 2018 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 14, "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 14, 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 in 2021.

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)	2018	2017
Cash and cash equivalents	$902	$1,436
Short-term investments	61	55
Total	$963	$1,491

Cash from operating activities - continuing operations

($ in millions, except percentages)				% Change	
	2018	2017	2016	2018 vs. 2017	2017 vs. 2016
Cash from operating activities	$1,487	$1,551	$1,218	(4.1)%	27.3%

2018 vs. 2017

The $64 million decrease in Cash from operating activities - continuing operations was primarily due to unfavorable changes in working capital and lower income in 2018 partially offset by lower cash taxes.

2017 vs. 2016

The $333 million increase in Cash from operating activities - continuing operations was primarily due to the absence of the prior year funding of the Pittsburgh Corning asbestos trust (the “Trust”), lower defined benefit pension contributions, lower restructuring payments and lower interest payments, partially offset by higher cash taxes paid in 2017 and higher working capital.

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 4, “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.

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)	2018		2017	
Trade Receivables, net	$2,505		$2,559	
Inventories, FIFO	1,896		1,833	
Trade Creditor’s Liabilities	2,177		2,321	
Operating Working Capital	$2,224		$2,071	
Operating Working Capital as a % of fourth quarter sales, annualized	15.3	%	14.1	%
Trade Receivables, net as a % of fourth quarter sales, annualized	17.2	%	17.4	%
Days sales outstanding	56		57	
Inventories, FIFO as a % of fourth quarter sales, annualized	13.0	%	12.4	%
Inventory turnover	4.8		4.8	

Environmental expenditures

($ in millions)	2018	2017	2016
Cash outlays related to environmental remediation activities	$64	$44	$47

We expect cash outlays for environmental remediation activities in 2019 to be between $80 million and $100 million.

Defined benefit pension plan contributions

($ in millions)	2018	2017	2016
U.S. defined benefit pension plans	$75	$54	$134
Non-U.S. defined benefit pension plans	$24	$33	$54

PPG contributed $75 million to its U.S. defined benefit pension plans in 2018. Contributions to PPG's non-U.S. defined benefit pension plans in 2018 were required by local funding requirements. PPG expects to make mandatory contributions to its non-U.S. defined benefit pension plans in the range of $20 million to $30 million in 2019. PPG may make voluntary contributions to its defined benefit pension plans in 2019 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). 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 14, "Commitments and Contingent Liabilities" under Item 8 of this Form 10-K for additional information.

Cash used for investing activities - continuing operations

($ in millions, except percentages)				% Change	
	2018	2017	2016	2018 vs. 2017	2017 vs. 2016
Cash (used for)/from investing activities	($764)	($63)	$472	1,112.7%	(113.3)%

2018 vs. 2017

The $701 million increase in cash used for investing activities - continuing operations, was primarily due to the absence of the prior year proceeds from the sale of the North American fiber glass business and higher capital expenditures, including business acquisitions.

2017 vs. 2016

The $535 million decrease in cash (used for)/from investing activities - continuing operations, was primarily due to the absence of the prior year proceeds from the sale of the flat glass business, European fiber glass business and two Asian joint ventures, as well as lower capital expenditures, including business acquisitions, partially offset by the current year proceeds from the sale of the North American fiber glass business.

Capital expenditures, including business acquisitions

($ in millions, except percentages)				% Change	
	2018	2017	2016	2018 vs. 2017	2017 vs. 2016
Capital expenditures (1)	$411	$360	$380	14.2%	(5.3)%
Business acquisitions, net of cash acquired (2)	$378	$325	$349	16.3%	(6.9)%
Total capital expenditures, including acquisitions	$789	$685	$729	15.2%	(6.0)%
Capital expenditures, excluding acquisitions, as a % of sales	2.7 %	2.4 %	2.7 %	12.5%	(11.1)%

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

(2) Including cash acquired, business acquisitions totaled $387 million, $332 million, and $362 million in 2018, 2017 and 2016, 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 2019.

A primary focus for the Company in 2019 will continue to be cash deployment focused on shareholder value creation, with a preference for business acquisitions.

Cash proceeds from divestitures

In September 2017, PPG completed the sale of its North American fiber glass business to Nippon Electric Glass Co. and received approximately $540 million in pre-tax cash proceeds.

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

Note 3, “Acquisitions and Divestitures” under Item 8 of this Form 10-K for additional information.

Cash used for financing activities - continuing operations

($ in millions, except percentages)	2018	2017	2016	% Change 2018 vs. 2017	% Change 2017 vs. 2016
Cash used for financing activities	($1,205)	($1,954)	($1,210)	(38.3)%	61.5%

2018 vs. 2017

The $749 million decrease in cash used for financing activities - continuing operations, was primarily due to the issuance of long term debt, partially offset by higher net purchases of treasury stock year-over-year.

2017 vs. 2016

The $744 million increase in cash used for financing activities - continuing operations, was primarily due to repayment of long term debt and higher dividends in 2017, partially offset by issuance of long term debt in 2016 and lower net purchases of treasury stock year-over-year.

Share repurchase activity

($ in millions, except number of shares)	2018	2017	2016
Number of shares repurchased (millions)	15.9	7.4	10.7
Cost of shares repurchased	$1,721	$813	$1,050

The Company has approximately $1.8 billion remaining under the current authorization from the Board of Directors, which was approved in December 2017. The current authorized repurchase program has no expiration date.

Dividends paid to shareholders

($ in millions)	2018	2017	2016
Dividends paid to shareholders	$453	$434	$414

PPG has paid uninterrupted annual dividends since 1899, and 2018 marked the 47th consecutive year of increased annual per-share dividend payments to shareholders. The Company raised its per-share quarterly dividend by 7% to $0.48 per share paid in September 2018.

Debt issued and repaid

Debt Issued	Year	$ in millions
$300 million 3.2% Note due 2023 and $700 million 3.75% Notes due 2028	2018	$992
€300 million 0.000% Notes due 2019 and €600 million 0.875% Notes due 2025	2016	987

Debt Repaid	Year	$ in millions
3-year variable rate bank loan due 2017	2017	$587
$125 million 6.65% notes due 2018	2016	133
Two $250 million Term Loan Credit Agreements	2016	500
$250 million 1.9% notes	2016	250

The ratio of total debt, including capital leases, to total debt and equity was 52% at December 31, 2018 up from 43% in 2017.

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 9, "Borrowings and Lines of Credit" under Item 8 of this Form 10-K. 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, 2018 and 2017, there were no borrowings outstanding.

In addition to the amounts available under the lines of credit, the Company maintains access to the capital markets and may issue debt or equity securities from time to time, which may provide an additional source of liquidity.

See Note 9, "Borrowings and Lines of Credit" under Item 8 of this Form 10-K for information regarding notes 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 access to capital markets will continue to be sufficient to fund our operating activities, capital spending, 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	2019	2020-2021	2022-2023	Thereafter
Contractual Obligations					
Long-term debt	$5,000	$644	$624	$981	$2,751
Short-term debt	4	4	—	—	—
Capital lease obligations	12	3	4	2	3
Operating leases	893	207	273	169	244
Interest payments(1)	1,257	130	250	170	707
Pension contributions(2)	30	30	—	—	—
Unconditional purchase commitments(3)	170	77	51	24	18
Other commitments	127	6	13	13	95
Total	$7,493	$1,101	$1,215	$1,359	$3,818

(1) Includes interest on all outstanding debt.

(2) Includes the high end of the range of the expected non-US mandatory pension contributions for 2019 only, as PPG is unable to estimate the pension contributions beyond 2019.

(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, 2018, 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 $182 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.

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 9, "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 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 14, "Commitments and Contingent Liabilities" and Note 12, "Income Taxes" 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 13, "Employee Benefit Plans" under Item 8 of this Form 10-K 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, 2017 to December 31, 2018, the U.S. dollar strengthened against all other major currencies associated with countries in which PPG operates, most notably the Australian dollar, British pound, Chinese yuan, euro and South Korean won. As a result, consolidated net assets at December 31, 2018 decreased by approximately $167 million from December 31, 2017. Comparing exchange rates from December 31, 2016 to December 31, 2017, the U.S. dollar was weaker 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, 2017 increased by approximately $231 million from December 31, 2016.

Comparing exchange rates during 2018 to those of 2017, in the countries in which PPG operates, there was a favorable impact of approximately $21 million on full year 2018 income before income taxes from the translation of this foreign income into U.S. dollars. Comparing exchange rates during 2017 to those of 2016, in the countries in which PPG operates, there was an unfavorable impact of approximately $7 million on full year 2017 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, the ability to achieve selling price increases, the ability to recover margins, customer inventory levels, our ability to maintain favorable supplier relationships and arrangements, the timing of and the realization of anticipated cost savings from restructuring initiatives, the ability to identify additional cost savings opportunities, difficulties in integrating acquired businesses and achieving expected synergies therefrom, economic and political conditions in the markets we serve, the 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, the effectiveness of our internal control over financial reporting, including the identification of additional control deficiencies, further expenditures related to our restatement, the results of governmental actions relating to pending investigations, the results of shareholder actions relating to the restatement of our financial statements 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 income, 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 10, "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 2018 and 2017 were generally designated as a hedge of PPG's exposure to foreign currency transaction risk. As of December 31, 2018 and 2017, the fair value of these contracts was a net asset of $36 million and a net liability of $19 million, respectively.

The potential reduction in PPG's Income before income taxes 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, 2018 and 2017 would have been $291 million and $255 million, respectively.

In February 2018, PPG entered into U.S. dollar to euro cross currency swap contracts with a total notional amount of $575 million outstanding, which had a fair value of a net asset of $35 million as of December 31, 2018. As of December 31, 2017, PPG had U.S. dollar to euro cross currency swap contracts with a total notional amount of $560 million outstanding, which had a fair value of a net asset of $2 million. 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 these instruments by $57 million and $58 million at December 31, 2018 and December 31, 2017, respectively.

As of December 31, 2018 and 2017, PPG had non-U.S. dollar denominated debt outstanding of $2.6 billion and $2.8 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 $299 million and $314 million as of December 31, 2018 and 2017, 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. In the first quarter of 2018, PPG entered into interest rate swaps which converted $525 million of fixed rate debt to variable rate debt. The fair value of these contracts was an asset of $8 million as of December 31, 2018. An increase in variable interest rates of 10% would lower the fair value of these swaps and increase interest expense by $10 million over the term of the instrument. 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, 2018 and 2017, respectively. Further, a 10% reduction in interest rates would have increased the present value of the Company's fixed rate debt by approximately $84 million and $61 million as of December 31, 2018 and 2017, respectively; however, such changes would not have had an effect on PPG's annual Income before income taxes 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 10, "Financial Instruments, Hedging Activities and Fair Value Measurements" and Note 14, "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.

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.
Opinions on the Financial Statements and Internal Control over Financial Reporting
We have audited the accompanying consolidated balance sheets of PPG Industries, Inc. and its subsidiaries (the "Company") as of December 31, 2018 and 2017, and the related consolidated statements of income, comprehensive income, shareholders' equity, and cash flows for each of the three years in the period ended December 31, 2018, including the related notes and schedule of valuation and qualifying accounts for each of the three years in the period ended December 31, 2018 appearing under Item 15(a)(2)(collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).
In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.
Basis for Opinions
The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management Report on Establishing and Maintaining Adequate Internal Control Over Financial Reporting under Item 8. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.
We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.
Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.
Definition and Limitations of Internal Control over Financial Reporting
A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding

prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/ PricewaterhouseCoopers LLP
Pittsburgh, Pennsylvania
February 21, 2019
We have served as the Company's auditor since 2013.

Management Report

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

We are 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. 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.

We conducted an evaluation of the effectiveness of the Company's internal control over financial reporting as of December 31, 2018. 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). Based on this evaluation we have concluded that, as of December 31, 2018, the Company's internal control over financial reporting were effective.

PricewaterhouseCoopers LLP, an independent registered public accounting firm, has issued their report, included on page 46 of this Form 10-K, regarding the Company's internal control over financial reporting.

/s/ Michael H. McGarry	/s/ Vincent J. Morales
Michael H. McGarry	Vincent J. Morales
Chairman and Chief Executive Officer	Senior Vice President and Chief Financial Officer
February 21, 2019	February 21, 2019

Consolidated Statement of Income

	For the Year		
($ in millions, except per share amounts)	2018	2017	2016
Net sales	$15,374	$14,748	$14,270
Cost of sales, exclusive of depreciation and amortization	9,001	8,209	7,665
Selling, general and administrative	3,573	3,554	3,555
Depreciation	354	331	319
Amortization	143	129	121
Research and development, net	441	451	453
Interest expense	118	105	125
Interest income	(23)	(20)	(26)
Business restructuring, net	66	—	191
Pension settlement charges	—	60	968
Asbestos settlement, net	—	—	5
Other charges	122	74	242
Other income	(114)	(150)	(127)
Income before income taxes	$1,693	$2,005	$779
Income tax expense	353	615	214
Income from continuing operations	$1,340	$1,390	$565
Income from discontinued operations, net of tax	18	225	330
Net income attributable to the controlling and noncontrolling interests	$1,358	$1,615	$895
Less: net income attributable to noncontrolling interests	17	21	22
Net income (attributable to PPG)	$1,341	$1,594	$873
Amounts Attributable to PPG			
Continuing operations	$1,323	$1,369	$543
Discontinued operations	18	225	330
Net income	$1,341	$1,594	$873
Earnings per common share			
Continuing operations	$5.43	$5.34	$2.05
Discontinued operations	0.07	0.88	1.24
Net income (attributable to PPG)	$5.50	$6.22	$3.29
Earnings per common share - assuming dilution			
Continuing operations	$5.40	$5.31	$2.04
Discontinued operations	0.07	0.87	1.23
Net income (attributable to PPG)	$5.47	$6.18	$3.27

Consolidated Statement of Comprehensive Income

	For the Year		
($ in millions)	2018	2017	2016
Net income attributable to the controlling and noncontrolling interests	$1,358	$1,615	$895
Unrealized foreign currency translation (losses)/gains	(155)	248	(476)
Defined benefit pension and other postretirement benefit adjustments	9	78	808
Unrealized (losses)/gains – derivative financial instruments	(1)	(10)	4
Other comprehensive (loss)/income, net of tax	(147)	316	336
Total comprehensive income	$1,211	$1,931	$1,231
Less: amounts attributable to noncontrolling interests:			
Net income	(17)	(21)	(22)
Unrealized foreign currency translation gains/(losses)	11	(17)	10
Comprehensive income attributable to PPG	$1,205	$1,893	$1,219

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

Consolidated Balance Sheet

	December 31	
($ in millions)	2018	2017
Assets		
Current assets		
Cash and cash equivalents	$902	$1,436
Short-term investments	61	55
Receivables	2,845	2,903
Inventories	1,783	1,730
Other	370	353
Total current assets	$5,961	$6,477
Property, plant and equipment, net	2,805	2,824
Goodwill	4,070	3,942
Identifiable intangible assets, net	1,972	2,045
Deferred income taxes	229	305
Investments	251	268
Other assets	727	677
Total	$16,015	$16,538
Liabilities and Shareholders' Equity		
Current liabilities		
Accounts payable and accrued liabilities	$3,623	$3,781
Restructuring reserves	99	102
Short-term debt and current portion of long-term debt	651	12
Total current liabilities	$4,373	$3,895
Long-term debt	4,365	4,134
Accrued pensions	645	729
Other postretirement benefits	629	699
Deferred income taxes	429	442
Other liabilities	842	967
Total liabilities	$11,283	$10,866
Commitments and contingent liabilities (See Note 14)		
Shareholders' equity		
Common stock	$969	$969
Additional paid-in capital	788	756
Retained earnings	18,131	17,140
Treasury stock, at cost	(12,958)	(11,251)
Accumulated other comprehensive loss	(2,300)	(2,057)
Total PPG shareholders' equity	$4,630	$5,557
Noncontrolling interests	102	115
Total shareholders' equity	$4,732	$5,672
Total	$16,015	$16,538

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 (Loss)/Income	Total PPG	Non-controlling Interests	Total
January 1, 2016	$969	$635	$15,521	($9,440)	($2,702)	$4,983	$86	$5,069
Net income attributable to the controlling and noncontrolling interests	—	—	873	—	—	873	22	895
Other comprehensive income/(loss), 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	—	35	—	—	—	35	—	35
Dividends paid on subsidiary common stock to noncontrolling interests	—	—	—	—	—	—	(4)	(4)
Reductions in noncontrolling interests	—	—	—	—	—	—	(7)	(7)
December 31, 2016	$969	$707	$15,980	($10,472)	($2,356)	$4,828	$87	$4,915
Net income attributable to the controlling and noncontrolling interests	—	—	1,594	—	—	1,594	21	1,615
Other comprehensive income, net of tax	—	—	—	—	299	299	17	316
Cash dividends	—	—	(434)	—	—	(434)	—	(434)
Purchase of treasury stock	—	—	—	(813)	—	(813)	—	(813)
Issuance of treasury stock	—	49	—	34	—	83	—	83
Dividends paid on subsidiary common stock to noncontrolling interests	—	—	—	—	—	—	(5)	(5)
Reductions in noncontrolling interests	—	—	—	—	—	—	(5)	(5)
December 31, 2017	$969	$756	$17,140	($11,251)	($2,057)	$5,557	$115	$5,672
Net income attributable to the controlling and noncontrolling interests	—	—	1,341	—	—	1,341	17	1,358
Other comprehensive loss, net of tax	—	—	—	—	(136)	(136)	(11)	(147)
Cash dividends	—	—	(453)	—	—	(453)	—	(453)
Purchase of treasury stock	—	—	—	(1,721)	—	(1,721)	—	(1,721)
Issuance of treasury stock	—	28	—	14	—	42	—	42
Stock-based compensation activity	—	4	—	—	—	4	—	4
Dividends paid on subsidiary common stock to noncontrolling interests	—	—	—	—	—	—	(7)	(7)
Reductions in noncontrolling interests	—	—	—	—	—	—	(12)	(12)
Reclassification from other comprehensive income to retained earnings - Adoption of ASU 2018-02	—	—	107	—	(107)	—	—	—
Adjustment to retained earnings - Adoption of ASU 2016-16	—	—	(4)	—	—	(4)	—	(4)
December 31, 2018	$969	$788	$18,131	($12,958)	($2,300)	$4,630	$102	$4,732

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

Consolidated Statement of Cash Flows

($ in millions)	For the Year 2018	2017	2016
Operating activities			
Net income attributable to the controlling and noncontrolling interests	$1,358	$1,615	$895
Less: Income from discontinued operations	18	225	330
Income from continuing operations	$1,340	$1,390	$565
Adjustments to reconcile to cash from operations:			
Depreciation and amortization	497	460	440
Defined benefit pension expense	43	65	85
Pension settlement charge	—	60	968
Business restructuring charge, net	66	—	191
Environmental remediation charges and other costs	77	—	82
Stock-based compensation expense	37	35	45
Gain on sale of land	(26)	—	—
Net gain, from sale of businesses	—	(25)	(39)
Equity affiliate (income)/loss, net of dividends	(1)	(4)	(6)
Deferred income taxes	45	38	171
Contributions to pension plans	(99)	(87)	(188)
Restructuring payments	(66)	(49)	(76)
Funding of asbestos settlement trust	—	—	(813)
Change in certain asset and liability accounts (net of acquisitions):			
Receivables	(69)	(76)	(68)
Inventories	(109)	(116)	56
Other current assets	5	(43)	21
Accounts payable and accrued liabilities	(76)	188	169
Noncurrent assets and liabilities, net	(207)	(170)	(53)
Taxes and interest payable	50	(129)	(268)
Other	(20)	14	(64)
Cash from operating activities - continuing operations	$1,487	$1,551	$1,218
Cash (used for)/from operating activities - discontinued operations	(20)	17	133
Cash from operating activities	$1,467	$1,568	$1,351
Investing activities			
Capital expenditures	($411)	($360)	($380)
Business acquisitions, net of cash balances acquired	(378)	(225)	(349)
Payments for acquisition of equity investment	—	(100)	—
Net proceeds from the sale of businesses	—	593	1,094
Proceeds from sale of land	27	—	—
Proceeds from maturity of short-term investments	—	—	92
Payments for the settlement of cross currency swap contracts	(28)	(34)	(36)
Proceeds from the settlement of cross currency swap contracts	23	37	37
Payments on net investment hedges	—	—	(13)
Other	3	26	27
Cash (used for)/from investing activities - continuing operations	($764)	($63)	$472
Cash used for investing activities - discontinued operations	—	(4)	(36)
Cash (used for)/from investing activities	($764)	($67)	$436
Financing activities			
Net change in borrowings with maturities of three months or less	($1)	($7)	($15)
Net payments on commercial paper and short-term debt	(2)	(93)	(361)

Net proceeds from the issuance of long-term debt (net of discount and issuance costs)	992	—	988
Repayment of long-term debt	(6)	(588)	(379)
Payments related to tax withholding on stock-based compensation awards	(15)	(28)	(26)
Purchase of treasury stock	(1,721)	(813)	(1,050)
Issuance of treasury stock	15	52	31
Dividends paid on PPG common stock	(453)	(434)	(414)
Other	(14)	(43)	16
Cash used for financing activities	($1,205)	($1,954)	($1,210)
Effect of currency exchange rate changes on cash and cash equivalents	(32)	69	(68)
Net (decrease)/increase in cash and cash equivalents	($534)	($384)	$509
Cash and cash equivalents, beginning of year	$1,436	$1,820	$1,311
Cash and cash equivalents, end of year	$902	$1,436	$1,820
Supplemental disclosures of cash flow information:			
Interest paid, net of amount capitalized	$108	$100	$118
Taxes paid, net of refunds	$380	$648	$349

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

Notes to the Consolidated Financial Statements

1. Summary of Significant Accounting Policies

Principles of Consolidation

The accompanying consolidated financial statements include the accounts of PPG Industries, Inc. ("PPG" or the "Company") and all subsidiaries, both U.S. and non-U.S., that it controls. PPG owns more than 50% of the voting stock of most of the subsidiaries that it controls. For those consolidated subsidiaries in which the Company's ownership is less than 100%, the outside shareholders' interests are shown as noncontrolling interests. Investments in companies in which PPG owns 20% to 50% of the voting stock and has the ability to exercise significant influence over operating and financial policies of the investee are accounted for using the equity method of accounting. As a result, PPG's share of income or losses from such equity affiliates is included in the consolidated statement of income and PPG's share of these companies' shareholders' equity is included in Investments on the consolidated balance sheet. Transactions between PPG and its subsidiaries are eliminated in consolidation.

Use of Estimates in the Preparation of Financial Statements

The preparation of financial statements in conformity with U.S. generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements, as well as the reported amounts of income and expenses during the reporting period. Such estimates also include the fair value of assets acquired and liabilities assumed resulting from the allocation of the purchase price related to business combinations consummated. Actual outcomes could differ from those estimates.

Revenue Recognition

Revenue is recognized as performance obligations with the customer are satisfied, at an amount that is determined to be collectible. For the sale of products, this generally occurs at the point in time when control of the Company's products transfers to the customer based on the agreed upon shipping terms.

Shipping and Handling Costs

Amounts billed to customers for shipping and handling are reported in Net sales in the consolidated statement of income. Shipping and handling costs incurred by the Company for the delivery of goods to customers are included in Cost of sales, exclusive of depreciation and amortization in the consolidated statement of income.

Selling, General and Administrative Costs

Amounts presented in Selling, general and administrative in the consolidated statement of income are comprised of selling, customer service, distribution and advertising costs, as well as the costs of providing corporate-wide functional support in such areas as finance, law, human resources and planning. Distribution costs pertain to the movement and storage of finished goods inventory at company-owned and leased warehouses and other distribution facilities.

Advertising Costs

Advertising costs are expensed as incurred and totaled $280 million, $313 million and $322 million in 2018, 2017 and 2016, respectively.

Research and Development

Research and development costs, which consist primarily of employee related costs, are charged to expense as incurred.

($ in millions)	2018	2017	2016
Research and development – total	$464	$472	$473
Less depreciation on research facilities	23	21	20
Research and development, net	$441	$451	$453

Legal Costs

Legal costs, primarily include costs associated with acquisition and divestiture transactions, general litigation, environmental regulation compliance, patent and trademark protection and other general corporate purposes, are charged to expense as incurred.

Income Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to operating losses and tax credit carryforwards as well as differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in Income tax expense in the consolidated statement of income in the period that includes the enactment date.

A valuation allowance will be provided against deferred tax assets if PPG determines it is more likely than not such assets will not ultimately be realized.

PPG does not recognize a tax benefit unless it concludes that it is more likely than not that the benefit will be sustained on audit by the taxing authority based solely on the technical merits of the associated tax position. If the recognition threshold is met, PPG recognizes a tax benefit measured at the largest amount of the tax benefit that, in PPG's judgment, is greater than 50 percent likely to be realized. PPG records interest and penalties related to uncertain tax positions in Income tax expense in the consolidated statement of income.

Foreign Currency Translation

The functional currency of most significant non-U.S. operations is their local currency. Assets and liabilities of those operations are translated into U.S. dollars using year-end exchange rates; income and expenses are translated using the average exchange rates for the reporting period. Unrealized foreign currency translation gains and losses are deferred in Accumulated other comprehensive loss on the consolidated balance sheet.

Cash Equivalents

Cash equivalents are highly liquid investments (valued at cost, which approximates fair value) acquired with an original maturity of three months or less.

Short-term Investments

Short-term investments are highly liquid, high credit quality investments (valued at cost plus accrued interest) that have stated maturities of greater than three months to less than one year. The purchases and sales of these investments are classified as Investing activities in the consolidated statement of cash flows.

Marketable Equity Securities

The Company's investment in marketable equity securities is recorded at fair market value and reported as Other current assets and Investments on the consolidated balance sheet with changes in fair market value recorded in income.

Inventories

Inventories are stated at the lower of cost or net realizable value. Most U.S. inventories are stated at cost, using the last-in, first-out ("LIFO") method of accounting, which does not exceed net realizable value. All other inventories are stated at cost, using the first-in, first-out ("FIFO") method of accounting, which does not exceed net realizable value. PPG determines cost using either average or standard factory costs, which approximate actual costs, excluding certain fixed costs such as depreciation and property taxes. See Note 4, "Working Capital Detail" for further information concerning the Company's inventory.

Derivative Financial Instruments

The Company recognizes all derivative financial instruments (a "derivative") as either assets or liabilities at fair value on the consolidated balance sheet. The accounting for changes in the fair value of a derivative depends on the use of the instrument.

For derivative instruments that are designated and qualify as cash flow hedges, the unrealized gains or losses on the derivatives are recorded in the consolidated statement of comprehensive income. Amounts in Accumulated other comprehensive loss on the consolidated balance sheet are reclassified into Income before income taxes in the consolidated statement of income in the same period or periods during which the hedged transactions are recorded in Income before income taxes in the consolidated statement of income.

For derivative instruments that are designated and qualify as fair value hedges, the change in the fair value of the derivatives are reported in Income before income taxes in the consolidated statement of income, offsetting the gain or loss recognized for the change in fair value of the asset, liability, or firm commitment that is being hedged.

For derivatives, debt or other financial instruments that are designated and qualify as net investment hedges, the gains or losses associated with the financial instruments are reported as translation gains or losses in Accumulated other comprehensive loss on the consolidated balance sheet. Gains and losses in Accumulated other comprehensive loss related to hedges of the Company's net investments in foreign operations are reclassified out of Accumulated other comprehensive loss and recognized in Income before income taxes in the consolidated statement of income upon a substantial liquidation, sale or partial sale of such investments or upon impairment of all or a portion of such investments. The cash flow impact of these instruments are classified as Investing activities in the consolidated statement of cash flows.

Changes in the fair value of derivative instruments not designated as hedges for hedge accounting purposes are recognized in Income before income taxes in the consolidated statement of income in the period of change.

Property, Plant and Equipment

Property, plant and equipment is recorded at cost. Depreciation is computed on a straight-line method based on the estimated useful lives of related assets. Additional depreciation expense is recorded when facilities or equipment are subject to abnormal economic conditions, restructuring actions or obsolescence.

The cost of significant improvements that add to productive capacity or extend the lives of properties are capitalized. Costs for repairs and maintenance are charged to expense as incurred. When a capitalized asset is retired or otherwise disposed of, the original cost and related accumulated depreciation balance are removed from the accounts and any related gain or loss is recorded in Income before income taxes in the consolidated statement of income. The amortization cost of capitalized leased assets is recorded in Depreciation expense in the consolidated statement of income. Property and other long-lived assets are reviewed for impairment whenever events or circumstances indicate that their carrying amounts may not be recoverable. See Note 5, “Property, Plant and Equipment” for further details.

Goodwill and Identifiable Intangible Assets

Goodwill represents the excess of the cost over the fair value of acquired identifiable tangible and intangible assets less liabilities assumed from acquired businesses. Identifiable intangible assets acquired in business combinations are recorded based upon their fair value at the date of acquisition.

PPG is a multinational manufacturer with 9 operating segments (which the Company refers to as “strategic business units”) that are organized based on the Company’s major products lines. These operating segments are also the Company’s reporting units for purposes of testing goodwill for impairment, which is tested at least annually in connection with PPG’s strategic planning process. The Company tests goodwill for impairment by either performing a qualitative evaluation or a quantitative test. The qualitative evaluation is an assessment of factors, including reporting unit specific operating results as well as industry, market and general economic conditions, to determine whether it is more likely than not that the fair values of a reporting unit is less than its carrying amount, including goodwill. The Company may elect to bypass this qualitative assessment for some or all of its reporting units and perform a quantitative test. The quantitative goodwill impairment test is performed during the fourth quarter by comparing the estimated fair value of the associated reporting unit as of September 30 to its carrying value. Fair value is estimated using discounted cash flow methodologies.

The Company has determined that certain acquired trademarks have indefinite useful lives. The Company tests the carrying value of these trademarks for impairment at least annually, or as needed whenever events and circumstances indicate that their carrying amount may not be recoverable. The annual assessment takes place in the fourth quarter of each year either by completing a qualitative assessment or quantitatively by comparing the estimated fair value of each trademark as of September 30 to its carrying value. Fair value is estimated by using the relief from royalty method (a discounted cash flow methodology). The qualitative assessment includes consideration of factors, including revenue relative to the asset being assessed, the operating results of the related business as well as industry, market and general economic conditions, to determine whether it is more likely than not that the fair value of the asset is less than its carrying amount.

Identifiable intangible assets with finite lives are amortized on a straight-line basis over their estimated useful lives (1 to 30 years) and are reviewed for impairment whenever events or circumstances indicate that their carrying amount may not be recoverable.

Receivables and Allowances

All trade receivables are reported on the consolidated balance sheet at the outstanding principal adjusted for any allowance for credit losses and any charge offs. The Company provides an allowance for doubtful accounts to reduce receivables to their estimated net realizable value when it is probable that a loss will be incurred. Those estimates are based on historical collection experience, current economic and market conditions, a review of the aging of accounts receivable and the assessments of current creditworthiness of customers.

Product warranties

The Company accrues for product warranties at the time the associated products are sold based on historical claims experience. The reserve, pre-tax charges against income and cash outlays for product warranties were not significant to the consolidated financial statements of the Company for any year presented.

Asset Retirement Obligations

An asset retirement obligation represents a legal obligation associated with the retirement of a tangible long-lived asset that is incurred upon the acquisition, construction, development or normal operation of that long-lived asset. PPG recognizes asset retirement obligations in the period in which they are incurred, if a reasonable estimate of fair value can be made. The

Notes to the Consolidated Financial Statements

asset retirement obligation is subsequently adjusted for changes in fair value. The associated estimated asset retirement costs are capitalized as part of the carrying amount of the long-lived asset and depreciated over its useful life. PPG's asset retirement obligations are primarily associated with the retirement or closure of certain assets used in PPG's manufacturing process. The accrued asset retirement obligation is recorded in Accounts payable and accrued liabilities and Other liabilities on the consolidated balance sheet, and was $22 million and $19 million as of December 31, 2018 and 2017, respectively.

PPG's only conditional asset retirement obligation relates to the possible future abatement of asbestos contained in certain PPG production facilities. The asbestos in PPG's production facilities arises from the application of normal and customary building practices in the past when the facilities were constructed. This asbestos is encapsulated in place and, as a result, there is no current legal requirement to abate it. Because there is no requirement to abate, the Company does not have any current plans or an intention to abate and therefore the timing, method and cost of future abatement, if any, are not known. The Company has not recorded an asset retirement obligation associated with asbestos abatement, given the uncertainty concerning the timing of future abatement, if any.

Reclassifications

Certain reclassifications of prior years' data have been made to conform to the current year presentation. These reclassifications had no impact on our previously reported Net income, cash flows or shareholders' equity.

Accounting Standards Adopted in 2018

Effective January 1, 2018, PPG adopted Accounting Standard Updates ("ASU") No. 2017-07, "Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost." This ASU requires the service cost component of these costs to be disaggregated from all other components and to be reported in the same line item or items as other compensation costs. The other components of these costs are required to be presented in the consolidated statement of income separately from the service cost component. This ASU required retrospective adoption for all prior periods presented.

The effect of the retrospective adoption on the consolidated statement of income related to the net periodic pension and other postretirement benefit costs was as follows:

	For the Year Ended December 31, 2017		
($ in millions)	As Previously Reported	Reclassifications	As Revised
Cost of sales, exclusive of depreciation and amortization	$8,207	$2	$8,209
Selling, general and administrative	$3,564	($10)	$3,554
Research and development, net	$453	($2)	$451
Other charges	$64	$10	$74
Income before income taxes			