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

FORM 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended December 31, 2022
or
☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the transition period from _______ to _______

Commission File Number 1-1687

PPG INDUSTRIES, INC.
(Exact name of registrant as specified in its charter)

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

Securities Registered Pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock – Par Value $1.66 2/3	PPG	New York Stock Exchange
0.875% Notes due 2025	PPG 25	New York Stock Exchange
1.875% Notes due 2025	PPG 25A	New York Stock Exchange
1.400% Notes due 2027	PPG 27	New York Stock Exchange
2.750% Notes due 2029	PPG 29A	New York Stock Exchange

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

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

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

Indicate by check mark whether the Registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months, and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by checkmark whether the registrant has submitted electronically every Interactive Date File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ☒ No ☐

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

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐	Smaller reporting company	☐
(Do not check if a smaller reporting company)		Emerging growth company	☐

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

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). ☐

Indicate by check mark whether the Registrant is a shell company (as defined by Rule 12b-2 of the Act). Yes ☐ No ☒

The aggregate market value of common stock held by non-affiliates as of June 30, 2022, was $26,830 million.

As of January 31, 2023, 235,179,993 shares of the Registrant's common stock, with a par value of $1.66 $^{2}/_{3}$ per share, were outstanding. As of that date, the aggregate market value of common stock held by non-affiliates was $30,608 million.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of PPG Industries, Inc. Proxy Statement for its 2023 Annual Meeting of Shareholders (the "Proxy Statement") to be filed with the Securities and Exchange Commission within 120 days after the end of the Company's fiscal year, are incorporated herein by reference into Part III of this report.

PPG INDUSTRIES, INC.
AND CONSOLIDATED SUBSIDIARIES

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

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Part I

Item 1. Business

PPG Industries, Inc. manufactures and distributes a broad range of paints, coatings and specialty materials. PPG was incorporated in Pennsylvania in 1883. PPG's vision is to be the world's leading coatings company by consistently delivering high-quality, innovative and sustainable solutions that customers trust to protect and beautify their products and surroundings.

PPG has a proud heritage with a demonstrated commitment to innovation, sustainability, community engagement and development of leading-edge paint, coatings and specialty materials technologies. Through dedication and industry-leading expertise, we solve our customers' biggest challenges, collaborating closely to find the right path forward. PPG is a global leader with manufacturing facilities and equity affiliates in more than 70 countries.

PPG supplies paints, coatings and specialty materials to customers serving a wide array of end-uses, including industrial equipment and components; packaging material; aircraft and marine equipment; automotive original equipment; automotive refinish; pavement marking products; as well as coatings for other industrial and consumer products. PPG also serves commercial and residential new build and maintenance customers by supplying coatings to painting and maintenance contractors and directly to consumers for decoration and maintenance.

The coatings industry is highly competitive and consists of several large firms with global presence and many firms supplying local or regional markets. PPG competes in its primary markets with the world's largest coatings companies, most of which have global operations, and with many regional coatings companies.

PPG's business is comprised of two reportable business segments: Performance Coatings and Industrial Coatings as described below:

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PERFORMANCE COATINGS

Strategic Business Unit	Products	Primary Customers / End-uses	Main Distribution Methods	Primary Brands
Aerospace Coatings	Coatings, sealants, transparencies, transparent armor, adhesives, engineered materials, packaging and chemical management services for the aerospace industry	Commercial, military, regional jet and general aviation aircraft	Direct to customers and company-owned distribution network	PPG®
Architectural Coatings Americas and Asia Pacific	Paints, wood stains, adhesives and purchased sundries	Painting and maintenance contractors and consumers for decoration and maintenance of residential and commercial building structures	Company-owned stores, home centers and other regional or national consumer retail outlets, paint dealers, concessionaires, independent distributors and direct to consumers	PPG®, GLIDDEN®, COMEX®, OLYMPIC®, DULUX® (in Canada), PPG PITTSBURGH PAINTS®, MULCO®, FLOOD®, LIQUID NAILS®, SICO®, RENNER®, TAUBMANS®, WHITE KNIGHT®, BRISTOL® and HOMAX®
Architectural Coatings Europe, Middle East and Africa (EMEA)				SIGMA®, HISTOR®, SEIGNEURIE®, GUITTET®, PEINTURES GAUTHIER®, RIPOLIN®, JOHNSTONE'S®, LEYLAND®, PRIMALEX®, DEKORAL®, TRILAK®, PROMINENT PAINTS®, GORI®, BONDEX®, DANKE!® and TIKKURILA®
Automotive Refinish Coatings	Coatings, solvents, adhesives, sealants, purchased sundries, software and putties	Automotive and commercial transport/fleet repair and refurbishing, light industrial coatings and specialty coatings for signs	Independent distributors and direct to customers	PPG®, SEM®, SPRINT®
Protective and Marine Coatings	Coatings and finishes for the protection of metals and structures	Metal fabricators, heavy duty maintenance contractors and manufacturers of ships, bridges and rail cars	Direct to customers, company-owned architectural coatings stores, independent distributors and concessionaires	PPG®
Traffic Solutions	Paints, thermoplastics, pavement marking products and other advanced technologies for pavement marking	Government, commercial infrastructure, painting and maintenance contractors	Direct to customers, government agencies and independent distributors	Ennis-Flint®

Segment Overview	This reportable business segment primarily supplies a variety of protective and decorative coatings, sealants and finishes along with pavement marking products, paint strippers, stains and related chemicals, as well as transparencies and transparent armor.
Alliances	PPG has an established alliance with Asian Paints Ltd. to serve certain automotive refinish customers in India.
Major Competitive Factors	Product performance, technology, quality, technical and customer service, price, customer productivity, distribution and brand recognition
Global Competitors	Akzo Nobel N.V., Axalta Coating Systems Ltd., BASF Corporation, Benjamin Moore, Hempel A/S, Kansai Paints, the Jotun Group, Masco Corporation, Nippon Paint, RPM International Inc., The Sherwin-Williams Company and 3M Company
Principal Manufacturing and Distribution Facilities	Amsterdam, Netherlands; Birstall, United Kingdom; Busan, South Korea; Carrollton, Texas; Clayton, Australia; Delaware, Ohio; Deurne, Belgium; Ennis, Texas; Gonfreville, France; Greensboro, North Carolina; Huntsville, Alabama; Huron, Ohio; Kunshan, China; Little Rock, Arkansas; Mexico City, Mexico; Milan, Italy; Mojave, California; Nykvarn, Sweden; Oakwood, Georgia; Ontario, Canada; Ostrow Wielkopolski, Poland; Ruitz, France; Shildon, United Kingdom; Sylmar, California; Stowmarket, United Kingdom; Tepexpan, Mexico; Vantaa, Finland; and Wroclaw, Poland.

INDUSTRIAL COATINGS

Strategic Business Unit	Products	Primary Customers / End-uses	Main Distribution Methods	Primary Brands
Automotive OEM[(a)] Coatings	Specifically formulated coatings, adhesives and sealants and metal pretreatments	Automotive original equipment, including both combustion engine and electric vehicles, and automotive parts and accessories, including battery-related components	Direct to manufacturing companies and various coatings applicators	PPG®
Industrial Coatings	Specifically formulated coatings, adhesives and sealants and metal pretreatments; services and coatings application	Appliances, agricultural and construction equipment, consumer electronics, building products (including residential and commercial construction), kitchenware, transportation vehicles and numerous other finished products; On-site coatings services within several customer manufacturing locations as well as at regional service centers.		PPG®
Packaging Coatings	Specifically formulated coatings	Metal cans, closures, and plastic tubes for food, beverage and personal care, and promotional and specialty packaging		PPG®
Specialty Coatings and Materials	Amorphous precipitated silicas, TESLIN® substrate, Organic Light Emitting Diode (OLED) materials, optical lens materials and photochromic dyes	Silicas - Tire, battery separator and other end-uses TESLIN - Labels, e-passports, drivers' licenses, breathable membranes, loyalty cards and identification cards OLED - displays and lighting Lens materials - optical lenses and color-change products		PPG® TESLIN®

(a) Original equipment manufacturer (OEM)

Segment Overview	This reportable business segment primarily supplies a variety of protective and decorative coatings and finishes along with adhesives, sealants, metal pretreatment products, optical monomers and coatings, low-friction coatings, precipitated silicas and other specialty materials.
Alliances	PPG has established alliances with Kansai Paints to serve Japanese-based automotive OEM customers in North America and Europe and Asian Paints Ltd. to serve certain aftermarket customers and automotive OEM customers in India.
Major Competitive Factors	Product performance, technology, quality, technical and customer service, price, customer productivity and distribution.
Global Competitors	Akzo Nobel N.V., Axalta Coating Systems Ltd., BASF Corporation, Kansai Paints, Nippon Paint and The Sherwin-Williams Company
Principal Manufacturing and Distribution Facilities	Barberton, Ohio; Busan, South Korea; Cieszyn, Poland; Cleveland, Ohio; Delfzijl, Netherlands; Lake Charles, Louisiana; Oak Creek, Wisconsin; Quattordio, Italy; San Juan del Rio, Mexico; Springdale, Pennsylvania; Sumaré, Brazil; Weingarten, Germany; and Suzhou, Tianjin and Zhangjiagang, China.

Research and Development

($ in millions, except percentages)	*2022*	*2021*	*2020*
Research and development costs, including depreciation of research facilities	$470	$463	$401
% of annual net sales	2.7 %	2.8 %	2.9 %

Technology innovation has been a hallmark of PPG’s success throughout its history. The Company seeks to optimize its investment in research and development to create new products to drive profitable growth. We align our product development with the macro trends in the markets we serve, including a focus on sustainability, and leverage core technology platforms to develop products to address unmet market needs. Additionally, we operate laboratories in close geographic proximity to our customers and we customize our products for our customers' end-use applications. Our history of successful technology introductions is based on a commitment to an efficient and effective innovation process and disciplined portfolio management. We have obtained government funding for a small portion of the Company’s research efforts, and we will continue to pursue government funding, where appropriate.

We own and operate several facilities to conduct research and development for new and improved products and processes. In addition to the Company’s centralized principal research and development centers (see Item 2. “Properties” of this Form 10-K), operating segments manage their development through centers of excellence. As part of our ongoing efforts to manage our formulations and raw material costs effectively, we operate global competitive sourcing laboratories. Because of our broad array of products and customers, we are not materially dependent upon any single technology platform.

Raw Materials, Energy and Logistics

PPG uses a wide variety of complex raw materials that serve as the building blocks of our manufactured products. The Company’s most significant raw materials include resins, reactants, solvents, titanium dioxide, epoxy and emulsions. Raw materials include both organic, primarily petroleum-derived, materials and inorganic materials. Raw materials represent PPG’s single largest production cost component.

Most of the raw materials and energy used in production are purchased from outside sources, and the Company has made, and continues to make, supply arrangements to meet our planned operating requirements for the future. Supply of critical raw materials and energy is managed by establishing contracts with multiple sources and identifying alternative materials or technology whenever possible. In support of our decarbonization efforts, we are increasing the amount of renewable energy secured for our operating facilities and increasingly evaluating alternative raw materials that offer sustainable benefits and support the circular economy, including recycled, bio-based, bio-circular feedstocks and biomass balance products. Prices for certain of our raw materials typically fluctuate with energy prices and global supply and demand changes; however, pricing may be impacted by the fact that the manufacture of our raw materials is several steps downstream from crude oil, natural gas, and other key feedstocks.

Through effective management of raw materials, energy and logistics, the Company aims to maintain a competitive cost position and ensure ongoing security of supply. Security of a sufficient supply of high-quality raw materials is important to PPG’s continued success as it allows the Company to increase production as necessary to keep pace with customer demand. In 2022, we continued to experience shortages of certain raw materials, which negatively impacted our ability to fully meet some of our customers’ demand. We continue to focus on improving our competitive cost position and expanding our supply of high-quality raw materials, including strategic initiatives to qualify multiple sources of supply.

We typically experience fluctuating prices for energy and raw materials driven by various factors, including changes in supplier feedstock costs and inventories, global industry activity levels, foreign currency exchange rates, government regulation, and global supply and demand factors. For 2022 versus 2021, we experienced increases in our operating costs of more than $1 billion, including significant raw material and energy cost inflation. The increases in raw material costs were primarily driven by higher supplier feedstock costs, higher energy prices, labor availability challenges, transportation shortages and higher ocean freight costs. Also in 2022, we experienced increases in other logistics costs, driven by supply chain disruptions, logistical challenges, labor shortages and manufacturing interruptions at both our factories and those of our suppliers and customers.

Given the uncertainty associated with the various factors that drive raw material prices, we are not able to predict the 2023 full-year impact of changes in raw material costs versus 2022; however, we expect the negative impact of raw material inflation to lessen as 2023 progresses.

We are subject to existing and evolving standards relating to the regulation and registration of chemicals which could potentially impact the availability and viability of some of the raw materials we use in our production processes. Our ongoing, global product stewardship efforts are directed at maintaining our compliance with these standards. We anticipate that the number of chemical registration regulations will continue to increase globally, and we have implemented programs to track and comply with these regulations.

Our commitment to sustainability extends to our suppliers as an extension of our internal focus on sustainability. The PPG Global Supplier Code of Conduct clarifies our global expectations in the areas of business integrity, labor practices, associate health and safety, and environmental management. Our Supplier Sustainability Policy builds upon our Global Supplier Code of Conduct by establishing expectations for sustainability within our supply chain. This policy reinforces our expectations that our suppliers, as well as their subcontractors, will comply fully with applicable laws and adhere to internationally recognized environmental, social and corporate-governance standards.

In both 2022 and 2021, PPG earned a Gold rating from EcoVadis™, a trusted business sustainability ratings platform. EcoVadis experts evaluate company performance on 21 factors related to environment, labor and human rights, ethics, and sustainable procurement. The rating methodology is based on international sustainability standards and initiatives, such as the Global Reporting Initiative (GRI) Standards, United Nations Global Compact and ISO 26000 standard (social responsibility). Maintaining a Gold rating from EcoVadis underscores PPG's ongoing commitment to corporate social responsibility and our efforts to manage our economic, social and environmental impact.

Global Operations

PPG has a significant investment in non-U.S. operations. This broad geographic footprint serves to lessen the significance to us of economic impacts occurring in any one region of the world. As a result of our global footprint, we are subject to certain inherent risks, including economic and political conditions in international markets, trade protection measures and fluctuations in foreign currency exchange rates. During 2022, unfavorable foreign currency translation decreased Net sales by approximately $775 million and Income before income taxes by approximately $85 million.

Refer to Note 20, "Revenue Recognition" in Item 8 of this Form 10-K for additional geographic information pertaining to sales and Note 21, "Reportable Business Segment Information" in Item 8 of this Form 10-K for geographic information related to PPG's property, plant and equipment.

Seasonality

PPG's Income before income taxes has typically been greater in the second and third quarters and Cash from operating activities has been greatest in the fourth quarter due to end-use market seasonality, primarily in our architectural coatings and traffic solutions businesses. Demand for our architectural coatings and traffic solutions products is typically the strongest in the second and third quarters due to higher home improvement, maintenance and construction activity during the spring and summer months in the U.S., Canada and Europe. The Latin American paint season is the strongest in the fourth quarter. These cyclical activity levels result in the collection of outstanding receivables and lower inventory on hand in the fourth quarter generating higher Cash from operating activities.

Human Capital

The average number of people employed by PPG during 2022 was approximately 52,000, of which approximately 15,600 were in the United States and approximately 36,400 were elsewhere in the world. The Company has numerous collective bargaining agreements throughout the world. We observe local customs, laws and practices in labor relations when negotiating collective bargaining agreements. There were no significant work stoppages in 2022. While we have experienced occasional work stoppages and may experience some work stoppages in the future, we believe that we will be able to negotiate all labor agreements on satisfactory terms. To date, these work stoppages have not had a significant impact on our results of operations. Overall, we believe we have good relationships with our employees.

The PPG Way is a set of behaviors that enables, empowers and engages each employee to fully live our values and realize our full potential as an organization. It guides our employees and leaders as we strive to achieve our purpose of protecting and beautifying the world. Employee engagement is a measure of the extent to which our employees are involved in, enthusiastic about, and committed to our work and workplace. We conduct employee surveys to increase dialogue among teams and implement meaningful action to improve results.

Our human capital management strategies provide the foundation for our teams to thrive and deliver exceptional performance. These strategies in the areas of culture and purpose, employee engagement, development and pay equity are overseen by the Human Capital Management and Compensation Committee of our Board of Directors. We are committed to ensuring our employees are safe, healthy, enabled, engaged and valued for the diverse talents they bring to PPG. We believe that having quality dialogue with our people, recognizing the value they bring and championing an authentic culture generates engaged employees and a company that is more innovative, productive and competitive. Our focus on and investment in learning and development are crucial to ensuring we keep our people engaged, productive and successful at every stage of their careers. We are committed to promoting from within wherever possible while also bringing in new ideas, thoughts and insights.

Our environmental, health and safety policy and standards define our expectations, and we implement programs and initiatives to reduce health and safety risk in our operations. We measure progress against our health and safety goals using the injury and illness rate, which is calculated as the number of illness and injury incidents per 200,000 work hours. For 2022 and 2021, our injury and illness rate was 0.30 and 0.26, respectively.

One of PPG's greatest strengths is the diversity of our people, who represent wide-ranging nationalities, cultures, languages, religions, ethnicities, and professional and educational backgrounds. Their unique perspectives enable us to meet challenges quickly, creatively and effectively, providing a significant competitive advantage in today's global economy. To ensure our people feel valued and respected, we are committed to providing a workplace that embraces a culture of diversity and inclusion and is free from harassment and bullying. In connection with our focus on diversity, equity and inclusion, PPG operates eight Employee Resource Networks ("ERNs"). These ERNs are open to all employees and are intended to provide an opportunity for in-depth discussion, focus and recommendations on how PPG can deliver higher growth and performance by creating a more diverse, equitable and inclusive organization.

More information about PPG's human capital management strategies and our workforce can be found in the Proxy Statement for our 2023 Annual Meeting of Shareholders and in our ESG Report located at http://sustainability.ppg.com.

Environmental Matters

PPG is committed to operating in a sustainable manner and to helping our customers meet their sustainability goals. Our sustainability efforts are governed by the Sustainability and Innovation Committee of our Board of Directors. At the management level, day-to-day implementation of our environmental, social and governance ("ESG") initiatives is led by our Vice President, Global Sustainability, who is responsible for coordinating PPG's ESG and sustainability programs and for communicating our ESG progress with our customers, shareholders and other stakeholders. The Vice President, Global Sustainability works with PPG's Sustainability Committee, a committee of management consisting of senior corporate executives, to establish and monitor our sustainability goals, policies, programs and procedures that incorporate sustainability into our business practices, including resource management, climate change impacts, innovation, community engagement, communications, procurement, manufacturing and employee wellness.

Our dedication to innovation is intertwined with sustainability. We are marketing an ever-growing variety of products and services that protect the environment and provide safety and other benefits to our customers. Our products contribute to lighter, more fuel-efficient vehicles, airplanes and ships, and they help our customers reduce their energy consumption, conserve water and reduce waste. These products include compact automotive paint processes and low cure capabilities that save energy and reduce water usage at customer manufacturing sites; sustainable, waterborne coatings formulations; sustainable powder coatings; lightweight sealants and coatings for aircraft; coatings that cool surfaces; coatings for recyclable metal packaging; antimicrobial products; coatings that contain reduced materials of concern; architectural coatings that contain lower carbon content raw materials; silica products for tires that improve vehicle fuel economy; and solutions for autonomous and battery-powered vehicles. Sales from sustainable products represented 39% of the Company's total Net sales for the year ended December 31, 2022.

PPG is committed to using resources efficiently and driving sustainability throughout our entire value chain, including continued focus on reducing greenhouse gas emissions, water withdrawal and total energy use. More information about PPG's sustainability values, efforts, goals and data and our community and employee engagement programs can be found in our ESG Report located at http://sustainability.ppg.com.

We are subject to existing and evolving standards relating to the protection of the environment. In management's opinion, the Company operates in an environmentally sound manner and is well positioned, relative to environmental matters, within the industries in which it operates. PPG is negotiating with various government agencies concerning current and former manufacturing sites and offsite waste disposal locations, including certain sites on the National Priority List. While PPG is not generally a major contributor of wastes to these offsite waste disposal locations, each potentially responsible party may face governmental agency assertions of joint and several liability. Generally, however, a final allocation of costs is made based on relative contributions of wastes to the site. There is a wide range of cost estimates for cleanup of these sites, due largely to uncertainties as to the nature and extent of their condition and the methods that may have to be employed for their remediation. The Company has established reserves for onsite and offsite remediation of those sites where it is probable that a liability has been incurred and the amount of loss can be reasonably estimated.

Our experience to date regarding environmental matters leads us to believe that we will have continuing expenditures for compliance with provisions regulating the protection of the environment and for present and future remediation efforts at waste and plant sites. Management anticipates that such expenditures will occur over an extended period of time.

In addition to the $217 million currently reserved for environmental remediation efforts, we may be subject to loss contingencies related to environmental matters estimated to be approximately $100 million to $200 million. These reasonably possible unreserved losses relate to environmental matters at a number of sites, none of which are individually significant. The loss contingencies related to these sites include significant unresolved issues such as the nature and extent of contamination at these sites and the methods that may have to be employed to remediate them.

($ in millions)	***2022***	***2021***	***2020***
Capital expenditures for environmental control projects	$22	$17	$12

It is expected that capital expenditures for such projects in 2023 will be in the range of $25 million to $35 million. Actual future capital expenditures may differ from expectations due to the inherent uncertainties involved in estimating future environmental remediation compliance costs, including possible technological, regulatory and enforcement developments, the results of environmental studies and other factors.

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. Refer to Note 15, "Commitments and Contingent Liabilities" in 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 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. 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, financial position and liquidity.

Economic Risks

The effects of the COVID-19 pandemic have negatively impacted and are continuing to adversely impact our financial condition and results of operations.

The effects of the public health crisis caused by COVID-19 have interfered with the ability of PPG, our suppliers, customers, and others to conduct business and have negatively affected consumer confidence and the global economy. Public health officials have recommended or mandated certain precautions to mitigate the spread of COVID-19, including prohibitions on congregating in groups, shelter-in-place orders, vaccination requirements or similar measures. Preventative and protective actions that public health officials, governments or PPG have taken with respect to COVID-19 have and will continue to adversely impact our business, suppliers, distribution channels, and customers, including business shutdowns or disruptions for an indefinite period of time, reduced operations, reduced workforce availability, reduced ability to supply products, or reduced demand for our products. Our financial condition, liquidity and results of operations have been and will continue to be adversely impacted by these preventative actions and the disruption to our business and that of our suppliers and customers. As we cannot predict the duration or scope of COVID-19, the negative financial impact to our business cannot be reasonably estimated, but could be material.

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. 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, within Asia and other lower cost regions of the world, diversification of our resin supply including 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. Despite our actions undertaken to maintain supply arrangements adequate to meet planned operating requirements, raw material supply chain disruptions, including logistical and transportation challenges in many regions, have adversely impacted, and may continue to adversely impact, our ability to procure raw materials, adversely impacting our financial results.

An inability to obtain certain critical raw materials has adversely impacted our ability to produce certain products and could do so in the future. 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.

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 the war in Ukraine, COVID-19, consumer sentiment and commodity market volatility, disruption in supply chains globally, potential changes to international trade agreements, the imposition of tariffs and the threat of additional tariffs, and labor shortages in certain regions of the world. 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.

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

We are exposed to foreign currency exchange rate risk with respect to our sales, expenses, profits, assets and liabilities denominated in 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 which are expressed in U.S. dollars.

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 customers, or compel us to reduce prices to remain competitive, which could result in reduced margins for our products. Additionally, our ability to increase prices may impact the overall economics for the products we offer. 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.

Legal, Regulatory, and Tax Risks

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, and the investigation and remediation of soil and groundwater affected by hazardous substances. In addition, various laws regulate 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 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. Any such claims, whether with or without merit, could be time consuming and 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 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 15, "Commitments and Contingent Liabilities" in 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.

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 sanctions and 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 costs.

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 becomes available. Recent developments, including potential U.S. or international tax reform, 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 were 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.

Operational and Strategic Risks

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 2022 by products sold outside the U.S. was approximately 60%.

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, including those potentially due to climate change, significant public health issues, 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.

Growth through acquisitions is an important component of the Company's strategy. 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, product liability, or existing information technology vulnerabilities;
- 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, or such anticipated benefits may never be realized, which 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 our 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, including an increase in the production of electric vehicles. 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 automotive 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.

Additionally, the development of customer-facing digital channels has and will continue to transform certain retail industries. An inability to develop such solutions and our customer's pace of adoption of those solutions could negatively affect our business or the market demand for our products.

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 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 intellectual property and confidential and personal data, our facilities and systems may be vulnerable to security breaches. This could lead to negative publicity, theft or other financial loss, modification or destruction of proprietary information or key information, manufacture of defective products, production downtimes and operational disruptions, which could adversely affect our reputation, competitiveness and results of operations.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

PPG's corporate headquarters is located in the United States in Pittsburgh, Pa. The Company's manufacturing facilities, sales offices, research and development centers and distribution centers are located throughout the world. Refer to Item 1. "Business" of this Form 10-K for the principal manufacturing and distribution facilities by reportable business segment.

The Company's principal research and development centers are located in Allison Park, Pa.; Tianjin, China; Cleveland, Oh.; Springdale, Pa.; Milan, Italy; Monroeville, Pa.; Harmar, Pa.; Ingersheim, Germany; Marly, France; Oak Creek, Wi.; Sumare, Brazil; Amsterdam, Netherlands; Vantaa, Finland; Tepexpan, Mexico; Burbank, Ca.; Zhangjiagang, China; Cheonan, Republic of Korea; Wroclaw, Poland; Bangplee, Thailand; and Sylmar, Ca.

Our headquarters, certain distribution centers and substantially all company-owned paint stores are located in facilities that are leased while our 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, property damage and certain other claims, 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.

From the late 1880's until the early 1970's, PPG owned property located in Cadogan and North Buffalo Townships, Pennsylvania which was used for the disposal of solid waste from PPG's former glass manufacturing facility in Ford City, Pennsylvania. In October 2018, the Pennsylvania Department of Environmental Protection (the "DEP") approved PPG's cleanup plan for the Cadogan Property. In April 2019, PPG and the DEP entered into a consent order and agreement ("CO&A") which incorporated PPG's approved cleanup plan and a draft final permit for the collection and discharge of seeps emanating from the former disposal area. The CO&A includes a civil penalty of $1.2 million for alleged past unauthorized discharges. PPG's former disposal area is also the subject of a citizens' suit filed by the Sierra Club and PennEnvironment seeking remedial measures beyond the measures specified in PPG's approved cleanup plan, a civil penalty in addition to the penalty included in the CO&A and plaintiffs' attorneys fees. PPG and the plaintiffs settled plaintiffs' claims for injunctive relief and PPG agreed to enhancements to the DEP approved cleanup plan and a $250,000 donation to a Pennsylvania nonprofit organization. This settlement has been memorialized by an amendment to the CO&A which was appended to a Consent Agreement between PPG and the plaintiffs which has been entered by the federal Court. The remaining claims in the case for attorneys' fees and a civil penalty are not affected by this settlement. PPG believes that the remaining claims are without merit and intends to defend itself against these claims 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 15, "Commitments and Contingent Liabilities" to the accompanying consolidated financial statements in 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 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.

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Information About Our Executive Officers

Set forth below is information related to the Company's executive officers as of February 16, 2023.

Name	*Age*	*Title*
Michael H. McGarry [(a)]	64	Executive Chairman since January 2023
Timothy M. Knavish [(b)]	57	President and Chief Executive Officer since January 2023
Anne M. Foulkes [(c)]	60	Senior Vice President and General Counsel since September 2018
Vincent J. Morales [(d)]	57	Senior Vice President and Chief Financial Officer since March 2017
Amy R. Ericson [(e)]	57	Senior Vice President, Protective and Marine Coatings since January 2023
Ramaprasad Vadlamannati [(f)]	60	Senior Vice President, Global Operations since January 2023

(a) On October 19, 2022, Mr. McGarry was elected as Executive Chairman, effective January 1, 2023. Mr. McGarry served as Chairman and Chief Executive Officer of the Company from September 2016 through December 2022 and as President and Chief Executive Officer from September 2015 through August 2016. Mr. McGarry previously served as 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) On October 19, 2022, Mr. Knavish was elected as President and Chief Executive Officer, effective January 1, 2023. Mr. Knavish served as Chief Operating Officer of the Company from March 2022 through December 2022. He previously served as Executive Vice President from October 2019 through February 2022, Senior Vice President, Architectural Coatings and President, PPG EMEA from January 2019 through September 2019, Senior Vice President, Industrial Coatings from October 2017 through December 2018, 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.

(c) Ms. Foulkes served as Senior Vice President, General Counsel and Secretary from April 2022 to June 2022 and from August 2018 to 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.

(d) 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.

(e) In January 2023, Ms. Ericson was named Senior Vice President, Protective and Marine Coatings. Ms. Ericson served as Senior Vice President, Packaging Coatings from July 2018 through December 2022. She 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.

(f) In January 2023, Mr. Vadlamannati was named Senior Vice President, Global Operations. Mr. Vadlamannati served as Senior Vice President, Protective and Marine Coatings and President PPG EMEA from October 2019 through December 2022, Senior Vice President, Protective and Marine Coatings from March 2016 through September 2019, 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, holders of common stock, and the stock performance graph is included in Exhibit 13.1 filed with this Form 10-K and is incorporated herein by reference.

No shares were repurchased in the three months ended December 31, 2022 under the current $2.5 billion share repurchase program approved in December 2017. The maximum number of shares that may yet be purchased under this program is 8,830,144 shares as of December 31, 2022. This repurchase program has no expiration date.

Item 6. [Reserved]

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion includes a comparison of our results of operations and liquidity and capital resources for the years ended December 31, 2022 and 2021. A discussion of changes in our results of operations for the year ended December 31, 2021 as compared to the year ended December 31, 2020 has been omitted from this Form 10-K, but may be found in "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" of our 2021 Form 10-K, filed with the Securities and Exchange Commission on February 17, 2022.

Highlights

Net sales were approximately $17.7 billion in 2022, an increase of 5% compared to the prior year, driven by higher selling prices resulting from continued selling price initiatives. The Company increased net sales despite softer demand conditions in Europe due in part to geopolitical issues, pandemic-related demand disruptions in China and unfavorable foreign currency translation impacts due to the strong appreciation of the U.S. dollar versus many foreign currencies.

Income before income taxes was $1,381 million in 2022, a decrease of $434 million compared to the prior year. This decrease was primarily due to raw material and other cost inflation, lower sales volumes, unfavorable foreign currency translation impacts, higher manufacturing costs related to supply and labor disruptions and impairment and other related charges, partially offset by increased selling prices.

Performance Overview

Net Sales by Region

			% Change
($ in millions, except percentages)	***2022***	***2021***	***2022 vs. 2021***
United States and Canada	$7,383	$6,676	10.6%
Europe, Middle East and Africa (EMEA)	5,458	5,436	0.4%
Asia Pacific	2,824	2,977	(5.1)%
Latin America	1,987	1,713	16.0%
Total	$17,652	$16,802	5.1%

Net sales increased $850 million due to the following:

- *Higher selling prices (+11%)*
- *Acquisition-related sales (+3%)*

Partially offset by:

- *Unfavorable foreign currency translation (-5%)*
- *Lower sales volumes (-3%)*
- *Divestiture-related sales and the wind down of Russia operations (-1%)*

For specific business results, see the Performance of Reportable Business Segments section within Item 7 of this Form 10-K.

Cost of sales, exclusive of depreciation and amortization

			% Change
($ in millions, except percentages)	***2022***	***2021***	***2022 vs. 2021***
Cost of sales, exclusive of depreciation and amortization	$11,096	$10,286	7.9%
Cost of sales as a % of net sales	62.9 %	61.2 %	1.7%

Cost of sales, exclusive of depreciation and amortization, increased $810 million due to the following:

- *Raw material, energy, wage and other cost inflation*
- *Cost of sales from acquired businesses*

Partially offset by:

- *Favorable foreign currency translation*
- *Lower sales volumes*

Selling, general and administrative expenses

			% Change
($ in millions, except percentages)	*2022*	*2021*	*2022 vs. 2021*
Selling, general and administrative expenses	$3,842	$3,780	1.6%
Selling, general and administrative expenses as a % of net sales	21.8 %	22.5 %	(0.7)%

Selling, general and administrative expenses increased $62 million primarily due to:

- *Selling, general and administrative expenses from acquired businesses*
- *Wage and other cost inflation*

Partially offset by:

- *Favorable foreign currency translation*
- *Restructuring cost savings*

Other charges and other income

			% Change
($ in millions, except percentages)	*2022*	*2021*	*2022 vs. 2021*
Interest expense	$167	$121	38.0%
Interest income	($54)	($26)	107.7%
Impairment and other related charges, net	$245	$21	1,066.7%
Pension settlement charge	$—	$50	N/A
Asbestos-related claims reserve adjustment	$—	($133)	N/A
Business restructuring, net	$33	$31	6.5%
Other (income)/charges, net	($60)	($143)	(58.0)%

Interest expense

Interest expense increased $46 million 2022 versus 2021 primarily due the unfavorable impact of higher interest rates on PPG's variable rate debt obligations and slightly higher levels of debt in the current year.

Interest income

Interest income increased $28 million primarily due to higher interest rates.

Impairment and other related charges, net

Impairment and other related charges of $290 million were recorded in the first quarter 2022 associated with the wind down of the Company's operations in Russia. Subsequently, the Company released a portion of the previously established reserves due to the collection of certain trade receivables and recorded recoveries due to the realization of certain previously written-down inventories, resulting in recognition of income of $63 million. The Company continues to consider actions to exit Russia, including a possible sale of its Russian business or controlled withdrawal from the Russian market.

During 2022 and 2021, the Company recorded impairment charges of $14 million and $21 million, respectively, related to certain smaller, non-strategic businesses. PPG committed to plans to sell these business and they were reclassified as held for sale. The impairment charges recorded represent the excess net book value of the net assets over the anticipated sales proceeds less costs to sell. The revenue of these businesses represent less than 1% of PPG annual net sales.

In the fourth quarter 2022, the Company recorded an impairment charge of $4 million to reduce the carrying value of certain indefinite-lived trademarks based on the results of the annual impairment test.

Refer to Note 6, “Goodwill and Other Identifiable Intangible Assets and Note 7 ”Impairment and Other Related Charges, Net” in Item 8 of this Form 10-K for additional information.

Pension settlement charge

In December 2021, the Company purchased group annuity contracts that transferred pension benefit obligations for certain of the Company's retirees in Canada to a third-party insurance company. This transaction resulted in a pension settlement charge of $50 million. Refer to Note 14, "Employee Benefit Plans" in Item 8 of this Form 10-K for additional information.

Asbestos-related claims reserve adjustment

In 2021, the reserve for asbestos-related claims was reduced to reflect the Company's current estimate of potential liability for these claims. Refer to Note 15 "Commitments and Contingent Liabilities" in Item 8 of this Form 10-K for additional information.

Business restructuring, net

Pretax restructuring charges of $84 million related to recent acquisitions were recorded in 2022, partially offset by certain changes in estimates to complete previously recorded programs of $51 million. Pretax restructuring charges of $54 million were recorded in 2021, offset by certain changes in estimates to complete previously recorded programs of $23 million. Refer to Note 8, "Business Restructuring" in Item 8 of this Form 10-K for additional information.

Other (income)/charges, net

Other (income)/charges, net was lower in 2022 compared to the prior year primarily due to a $34 million gain on the sale of a production facility in 2021 in connection with the Company's manufacturing footprint consolidation plans and associated restructuring programs as well as favorable legal settlements in 2021. Refer to Note 18, "Other (Income)/Charges, Net" 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)	2022	2021	% Change 2022 vs. 2021
Income tax expense	$325	$374	(13.1)%
Effective tax rate	23.5 %	20.6 %	2.9%
Adjusted effective tax rate, continuing operations*	22.0 %	20.0 %	2.0%
Earnings per diluted share, continuing operations	$4.33	$5.93	(27.0)%
Adjusted earnings per diluted share, continuing operations*	$6.05	$6.77	(10.6)%

*See the Regulation G reconciliations - results of operations

The effective tax rate for the year-ended December 31, 2022 was 23.5%, an increase of 2.9% from the prior year primarily driven by charges associated with PPG's operations in Russia along with a reduction in the release of reserves for uncertain tax positions compared to the prior year.

Earnings per diluted share and adjusted earnings per diluted share from continuing operations for the year ended December 31, 2022 decreased year over year primarily due raw material cost inflation, lower sales volumes, unfavorable foreign currency translation impact and higher manufacturing costs related to supply and labor disruptions, partially offset by increased selling prices. Refer to the Regulation G Reconciliations - Results from Operations for additional information.

Regulation G Reconciliations - Results from Operations

PPG believes investors' understanding of the Company's performance is enhanced by the disclosure of net income from continuing operations, earnings per diluted share from continuing operations, PPG's effective tax rate and segment income adjusted for certain items. PPG's management considers this information useful in providing insight into the Company's ongoing 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 from continuing operations, earnings per diluted share from continuing operations, the effective tax rate and segment income adjusted for these items are not recognized financial measures determined in accordance with U.S. generally accepted accounting principles ("U.S. GAAP") and should not be considered a substitute for net income from continuing operations, earnings per diluted share from continuing operations, the effective tax rate, segment income or other financial measures as computed in accordance with U.S. GAAP. In addition, adjusted net income, adjusted earnings per diluted share and the adjusted 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 from continuing operations, the effective tax rate from continuing operations is reconciled to the adjusted effective tax rate from continuing operations and net income from continuing operations (attributable to PPG) and earnings per share – assuming dilution (attributable to PPG) are reconciled to adjusted net income from continuing operations (attributable to PPG) and adjusted earnings per share – assuming dilution below.

($ in millions, except percentages and per share amounts)	Income Before Income Taxes	Income Tax Expense	Effective Tax Rate	Net income from continuing operations (attributable to PPG)	Earnings per diluted share[1]
Year-ended December 31, 2022					
As reported, continuing operations	$1,381	$325	23.5 %	$1,028	$4.33
Includes:					
Impairment and other related charges, net[2]	245	31	12.7 %	214	0.90
Acquisition-related amortization expense	166	40	24.1 %	126	0.53
Business restructuring-related costs, net[3]	75	19	25.3 %	56	0.24
Transaction-related costs, net[4]	10	(2)	(20.0 %)	12	0.05
Adjusted, continuing operations, excluding certain items	$1,877	$413	22.0 %	$1,436	$6.05

($ in millions, except percentages and per share amounts)	Income Before Income Taxes	Income Tax Expense	Effective Tax Rate	Net income from continuing operations (attributable to PPG)	Earnings per diluted share[1]
Year-ended December 31, 2021					
As reported, continuing operations	$1,815	$374	20.6 %	$1,420	$5.93
Includes:					
Acquisition-related amortization expense	172	42	24.4 %	130	0.55
Transaction-related costs, net[4]	86	17	19.8 %	69	0.29
Pension settlement charge	50	14	26.6 %	36	0.15
Net charges related to environmental remediation	35	9	24.3 %	26	0.11
Net tax charge related to U.K. statutory rate change	—	(22)	N/A	22	0.09
Business restructuring-related costs, net[3]	27	7	25.9 %	20	0.08
Expenses incurred due to natural disasters[5]	17	4	24.3 %	13	0.06
Impairment and other related charges, net[2]	21	6	29.2 %	12	0.05
Decrease in allowance for doubtful accounts related to COVID-19	(14)	(3)	24.7 %	(11)	(0.05)
Income from legal settlements	(22)	(5)	24.3 %	(17)	(0.07)
Asbestos-related claims reserve adjustment[6]	(133)	(32)	24.3 %	(101)	(0.42)
Adjusted, continuing operations, excluding certain items	$2,054	$411	20.0 %	$1,619	$6.77

(1) Earnings per diluted share is calculated based on unrounded numbers. Figures in the table may not recalculate due to rounding.

(2) In the first quarter 2022, the Company recorded impairment and other related charges due to the wind down of the company's operations in Russia. Subsequently, the Company released a portion of the previously established reserves for Receivables and Inventories due to the collection of certain trade receivables and the realization of certain inventories. Also in 2022, impairment and other related charges were recorded for the write-down of certain assets and liabilities related to the planned sale of a non-core business and for certain asset write downs. In 2021, an impairment charge was recorded for the write-down of certain assets related to the previously planned sale of certain smaller entities in non-strategic regions. Net loss of $3 million related to the 2021 impairment charge was attributable to noncontrolling interests.

(3) Included in business restructuring-related costs, net are business restructuring charges, accelerated depreciation of certain assets and other related costs, offset by releases related to previously approved programs and a $34 million gain on the sale of certain assets in 2021 in connection with the Company's manufacturing footprint consolidation plans and associated restructuring programs. This gain is included in Other (income)/charges, net in the consolidated statement of income.

(4) Transaction-related costs, net include advisory, legal, accounting, valuation, other professional or consulting fees, and certain internal costs directly incurred to effect acquisitions, as well as similar fees and other costs to effect disposals not classified as discontinued operations. These costs are included in Selling, general and administrative expense in the consolidated statement of income. Transaction-related costs also include losses on the sale of certain assets, which are included in Other income, net in the consolidated statement of income, and the impact for the step up to fair value of inventory acquired in certain acquisitions, which are included in Cost of sales, exclusive of depreciation and amortization in the consolidated statement of income.

(5) In early 2021, a winter storm damaged a southern U.S. factory supporting the Company's specialty coatings and materials business as well as other Company factories in the southern U.S. Incremental expenses incurred due to this storm included costs related to maintenance and repairs of damaged property, freight and utility premiums and other incremental expenses directly related to the impacted areas.

(6) In the fourth quarter 2021, the reserve for asbestos-related claims was reduced to reflect the Company's current estimate of potential liability for these claims.

Performance of Reportable Business Segments

Performance Coatings

			$ Change	% Change
($ in millions, except percentages)	*2022*	*2021*	*2022 vs. 2021*	*2022 vs. 2021*
Net sales	$10,694	$10,333	$361	3.5%
Segment income	$1,399	$1,491	($92)	(6.2)%
Amortization expense	$123	$126	($3)	(2.4)%
Segment income, excluding amortization expense	$1,522	$1,617	($95)	(5.9)%

Performance Coatings net sales increased due to the following:

- *Higher selling prices (+10%)*
- *Acquisition-related sales (+3%)*

Partially offset by:

- *Unfavorable foreign currency translation (-5%)*
- *Lower sales volumes (-4%)*
- *Divestiture-related sales and the wind down of Russia operations (-1%)*

In 2022, all businesses within the Performance Coatings reportable business segment achieved higher selling prices consistent with our focus on mitigating raw material and other cost inflation. These price increases also helped to offset softer demand conditions in Europe due in part to geopolitical issues, the impact of pandemic-related restrictions in China, softening do-it-yourself ("DIY") demand and unfavorable foreign currency translation.

Architectural coatings – EMEA net sales, excluding the impact of currency, acquisitions, divestitures and the wind down of Russia operations ("organic sales") were flat compared to prior year as selling price increases were offset by lower sales volumes. Sales were negatively impacted by geopolitical uncertainty, including the war in Ukraine, lower demand for DIY paint products and unfavorable foreign currency translation.

Architectural coatings – Americas and Asia Pacific organic sales increased a mid-single-digit percentage during the year primarily due to selling price increases that more than offset lower sales volumes. Sales in the U.S. and Canada were unfavorably impacted by raw material availability, which improved as the year progressed, and softening DIY demand. In Mexico, PPG Comex architectural coatings organic sales increased compared to the prior year as concessionaire network demand continued to be strong throughout 2022 and further selling price increases were implemented.

Automotive refinish coatings organic sales increased by a high-single-digit percentage due to selling price increases in all regions and volume growth in the U.S. stemming from higher miles driven, increased collision claims and more people returning to office work versus 2021. Sales were negatively impacted by softer demand in Europe and the impact of pandemic-related restrictions in China.

Aerospace coatings organic sales increased by a high-teen-percentage due to increased selling prices and sales volumes in all regions. Sales volumes increased in all regions compared to prior year, but still remain below pre-pandemic levels. Net sales benefited from continued strong demand for military applications and for PPG's technology-advantaged products.

Organic sales in the protective and marine coatings business were higher by a mid-single-digit percentage due to selling price increases in all regions. Sales were negatively affected by pandemic-related restrictions in China.

Traffic solutions organic sales increased by a low-teen-percentage as higher selling prices and solid volume growth in the U.S. and Latin America were partially offset by lower sales volumes in Europe and the Asia Pacific region.

Segment income decreased $92 million year over year primarily due to raw material and logistics cost inflation, lower sales volumes and the impact of unfavorable foreign currency translation, partially offset by higher selling prices, savings from previously approved restructuring actions and acquisition-related earnings.

Looking Ahead

In the first quarter 2023, demand conditions in Europe and China are expected to remain similar to the fourth quarter 2022, including potential pandemic-related disruptions. Raw material and transportation availability continue to improve, with the biggest challenges remaining in the aerospace coatings business. Aggregate sales volumes are anticipated to be lower by a mid-single-digit percentage compared to the first quarter 2022 driven by the unfavorable impacts in Europe and China and continued soft architectural coatings DIY demand. The impact of divestiture-related sales and sales related to the Russia business, which the Company is in the process of winding down, are anticipated to reduce sales by about $40 million. The Company will continue to focus on executing various existing cost-savings initiatives.

Industrial Coatings

($ in millions, except percentages)	2022	2021	$ Change 2022 vs. 2021	% Change 2022 vs. 2021
Net sales	$6,958	$6,469	$489	7.6%
Segment income	$643	$680	($37)	(5.4)%
Amortization expense	$43	$46	($3)	(6.5)%
Segment income, excluding amortization expense	$686	$726	($40)	(5.5)%

Industrial Coatings segment net sales increased due to the following:

- *Higher selling prices (+13%)*
- *Acquisition-related sales (+3%)*

Partially offset by:

- *Unfavorable foreign currency translation (-4%)*
- *Lower sales volumes (-3%)*
- *Divestiture-related sales and the wind down of Russia operations (-1%)*

In 2022, all businesses within the Industrial Coatings reportable business segment achieved higher selling prices consistent with our focus on mitigating raw material and other cost inflation. These price increases also helped to offset softer demand conditions in Europe due in part to geopolitical issues, the impact of pandemic-related restrictions in China and unfavorable foreign currency translation.

Automotive OEM coatings organic sales increased by more than 10% led by higher selling prices in all regions and higher sales volumes in the U.S. and Latin America. Sales were unfavorably impacted by industry-wide production disruptions due to semiconductor chip shortages, which continued in 2022 but improved as the year progressed. Sales volumes were also impacted by lower automotive industry production due to the geopolitical uncertainty in Europe and the impact of pandemic-related disruptions in China.

For the industrial coatings business, organic sales increased by a high-single-digit percentage year over year as strong selling price increases in all regions and solid volume growth in the U.S. and Latin America were partially offset by reduced sales volumes in China and Europe reflecting lower economic activity in those regions.

Packaging coatings organic sales increased by a high-single-digit percentage year over year due to higher selling prices in all regions. Sales volumes were strong in the U.S. but were negatively impacted by geopolitical uncertainty in Europe and pandemic-related restrictions in China.

Specialty coatings and materials organic sales increased by nearly 20% versus the prior year driven by higher selling prices in all regions and volume growth in Europe.

Segment income decreased $37 million year over year primarily due to raw material and logistics cost inflation, lower sales volumes and the impact of unfavorable foreign currency translation, partially offset by higher selling prices and savings from previously approved restructuring actions.

Looking Ahead

In the first quarter 2023, global industrial production is expected to remain at lower levels. In China, pandemic-related disruptions are expected to continue into the first quarter. Aggregate sales volumes are anticipated to decline by a mid-single-digit percentage compared to the first quarter 2022. Sales volumes are expected to be similar to the prior year quarter in the automotive OEM coatings business but lower in the industrial coatings, packaging coatings, and specialty coatings and materials businesses. Positive selling price is expected to continue, although some of the strong selling prices realized in 2022 will begin to reach their anniversary in the first quarter. Year-over-year segment margins are expected to continue to improve on a sequential basis in the first quarter 2023. The Company will continue to focus on executing against various existing cost-savings initiatives.

Review and Outlook

PPG's net sales, excluding foreign currency translation impact, increased approximately 10% versus the prior year and were a record $17.7 billion. Organic sales increased by about 8% driven by higher selling prices, partially offset by lower sales volumes. Acquisition-related sales contributed 3% to net sales growth compared to prior year as the Company benefited from four strategic acquisitions that were completed in 2021. Foreign currency translation was unfavorable for the year and impacted net sales by about 5%. During 2022, severe cost inflation, supply disruptions, geopolitical issues in Europe and continuing impacts from the pandemic significantly impacted net sales and earnings. There was partial recovery in the end-use markets that were impacted by mobility restrictions in 2020 and 2021, such as automotive OEM, automotive refinish coatings and aerospace coatings, but all three remained below 2019 global demand levels. Demand was mixed by geographic region. In the U.S. and Canada and Latin America regions, demand was solid throughout the year in most businesses despite supply disruptions constraining sales more than other regions. Demand was the softest in Europe due in part to geopolitical issues, including the war in Ukraine, with the largest impact on the architectural coatings business. In Asia, demand was mixed, as activity in China was impacted by ongoing pandemic-related restrictions and associated disruptions, while demand conditions in the rest of Asia were more stable. Despite ongoing component shortages that constrained global automotive OEM manufacturers' production, global builds increased by about 6% versus 2021 due to strong underlying demand in most regions and supply deficits that are expected to remain into 2023. Raw material cost inflation trended higher for most of the year, finishing the fourth quarter about 35% above fourth quarter 2019 levels. In the fourth quarter 2022, raw material inflation began to moderate and is anticipated to ease further in 2023. Some other key costs continued to increase in 2022, including logistics, employee wage and benefit costs, and energy costs. The Company continued to collaborate with its customers to implement selling price increases to mitigate elevated input costs, resulting in an 11% increase in selling prices compared to 2021.

U.S. and Canada

In 2022, economic activity remained robust and continued to recover from the lower demand levels experienced in 2021 due to pandemic-related restrictions. For the full year, U.S. gross domestic product ("GDP") and industrial production increased by approximately 2% and 4%, respectively. Demand in the residential and commercial construction markets was strong at the beginning of the year but softened as interest rates increased as the year progressed. New home starts decreased by a mid-single-digit percentage in 2022 versus a mid-teen percentage increase in 2021. Residential remodeling was down by approximately 10% in 2022 versus 2021 as solid housing fundamentals were offset by the impact of higher interest rates. Commercial construction was down approximately 10% compared to 2021. Market demand for architectural paint continued to shift back to do-it-for-me ("DIFM") from the DIY channel during the year as lower U.S. unemployment and increased mobility resulted in consumers choosing to hire professional paint contractors. Earnings were aided by strong selling price increases, but negatively impacted by higher levels of inflation, including historically high raw material cost inflation and higher than normal salary and wage increases due to the high level of employment in the U.S. Architectural coatings sales volumes in the U.S. and Canada were negatively impacted by severe raw material shortages that prevented the Company from meeting the demand for its architectural products, mostly impacting the higher demand periods of spring and summer.

Automotive OEM industry builds were up nearly 10% compared to 2021 as component shortages began to moderate and underlying demand for new automobiles was solid. The aerospace coatings business continued what is expected to be a multi-year recovery to return to 2019 activity levels. Before the pandemic, the Company's sales mix was approximately 70% commercial and 30% military. During the pandemic and through 2022, sales volumes for military applications remained solid, in part due to specification of PPG products with advantaged technology. The commercial segment remains down about 15%, as overall improved flying activity still remains below 2019 levels, mostly impacted by lower activity in China. With the lifting of pandemic-related restrictions in China, it is expected that global commercial aftermarket and new build demand will continue to improve in 2023. The automotive refinish coatings business experienced strong demand through the year as miles driven and collision claims trended closer to pre-pandemic levels. Sales were constrained due to ongoing supply disruptions, which has led to lower industry inventory levels. The packaging coatings business was favorably impacted by new business wins at several new packaged beverage can customers and overall solid demand for the Company's sustainable products. The traffic solutions business, which represents the Ennis-Flint acquisition completed in December 2020, made good progress realizing synergies and achieved a low-teen percentage growth in organic sales.

U.S. and Canada organic sales increased by more than 10% compared to 2021 driven by higher selling prices in all businesses. Solid year-over-year sales volume increases in the aerospace, automotive refinish, industrial, automotive OEM and packaging coatings businesses were partially offset by lower year-over-year sales volumes in the architectural and protective and marine coatings businesses. Aggregate regional sales volumes remain more than 10% lower than the fourth quarter 2019. The U.S. and Canada remained PPG's largest region, with sales of $7.4 billion, representing approximately 42% of 2022 net sales.

Europe, Middle East and Africa

European demand for coatings softened in 2022, mostly impacted by geopolitical issues and high levels of inflation. Supply chain disruptions lessened during 2022 but continued to impact certain end-use markets, most notably automotive OEM. In the first quarter, activity in this region was negatively impacted by mobility restrictions associated with pandemic-related disruptions. While the impact of the pandemic eased throughout the year, consumer confidence worsened as the year progressed due to elevated costs and the war in Ukraine, which significantly impacted demand for coating products. Component shortages continued to constrain automotive OEM sales volumes. Automotive builds in 2022 were at similar levels as 2021. Architectural coatings – EMEA organic sales were flat compared to the prior year as selling price increases were offset by lower sales volumes. Net sales for architectural DIFM products improved as compared to the prior year. Integration of the June 2021 acquisition of Tikkurila continued with good progress toward realizing targeted synergies. In addition, the integration efforts continued for the two automotive OEM acquisitions made in 2021, Wörwag and Cetelon, with PPG continuing to realize acquisition-related synergies and leverage acquired product technologies to drive sales growth. Net sales were aided by partial recovery in the aerospace and automotive refinish coatings businesses. Demand was soft for architectural coatings, packaging coatings and general industrial coatings products.

EMEA net sales of $5.5 billion represented 31% of PPG's 2022 net sales, modestly higher than 2021. Organic sales improved by a mid-single-digit percentage compared to 2021 led by higher selling prices and acquisition-related sales, which were partially offset by lower sales volumes. Net sales, excluding the impact of foreign currency translation, increased by a low-teen percentage. Sales volumes in the region were down a mid-teen percentage compared to 2019.

Asia Pacific and Latin America

The regions of Asia Pacific and Latin America represented 27% of PPG's 2022 net sales in aggregate, similar to the prior year.

Net sales were $2.8 billion in the Asia Pacific region, led by China, which remained PPG's second largest country by revenue. Net sales in 2022 decreased by 5% compared to 2021 as higher selling prices and solid sales volume growth in India were more than offset by lower sales volumes in China due to pandemic-related restrictions and the impact of unfavorable foreign currency translation. Sales activity was most impacted in China during a period of heightened mandated shut-downs in the second quarter and during the fourth quarter as the country began to move away from its zero-COVID policy. In China, demand for coatings products is expected to improve in 2023 driven by stronger domestic consumption and fewer mobility restrictions. In the region, sales volumes were most unfavorable in the protective and marine, industrial, automotive refinish and packaging coatings businesses. In 2022, there were periods of strong automotive retail sales activity, partially due to government stimulus and strong sales of electric vehicles in China. During 2022, sales volume growth was strongest in India as the easing of pandemic-related restrictions led to increased economic activity. Sales volumes in the region were lower by about 10% compared to 2021 and were lower by a mid-teen-percentage compared to 2019.

Net sales in Latin America in 2022 were $2.0 billion, representing a 16% increase compared to 2021. Overall, demand in the region increased year over year driven by improved economic activity in most end-use markets. Organic sales were higher by a mid-teen-percentage compared to 2021 due to higher selling prices and sales volumes. The PPG Comex business made strong contributions, which continued to outpace the industry. The business added more concessionaire locations during 2022, bringing the total to over 5,100 locations. Additionally, both reportable segments delivered sales volume growth on a year-over-year basis. Sales volumes in the region increased by a low-single-digit percentage compared to 2019.

Outlook

We expect softening global economic activity in 2023 that will likely be uneven by region and end-use. As 2023 progresses, we expect demand for architectural coatings products in the U.S. to be negatively impacted by higher interest rates, while we anticipate demand to gradually improve in China as it transitions away from zero-COVID policies and supply chain disruptions continue to ease. In Europe, we expect demand to remain soft due to ongoing geopolitical issues and inflation. In general, most end-use markets do not have significant excess inventories, and any demand improvement should lead to a faster ramp-up of sales volumes. Continued recovery is expected in the automotive refinish, automotive OEM and aerospace coatings businesses, which collectively accounted for about 40% of the Company's pre-pandemic sales and where the Company has broad, global businesses supported by advantaged technologies.

Supply chain and pandemic-related disruptions experienced during the past three years are expected to ease as 2023 progresses, which should allow for ample supply of commodity-related raw materials in all regions. We also expect the Company's ability to manufacture and deliver product to improve as the year progresses, leading to better manufacturing efficiencies.

We anticipate that PPG's growth in the U.S. and Canada will be led by the aerospace coatings, automotive refinish coatings and traffic solutions businesses. Automotive OEM industry builds in the region are expected to increase slightly compared to 2022. Architectural coatings demand is expected to moderate and may fall as the year progresses due to higher interest rates, lower single-family home construction and lower sales of existing homes. Traffic solutions and protective coatings demand should be aided later in 2023 as infrastructure spending continues to gain momentum.

We expect European industry demand trends in 2023 to remain similar to those experienced in the second half of 2022. Automotive OEM builds are expected to increase modestly from historical lows, and aerospace demand is expected to continue to recover from its pandemic lows. Overall demand is expected to be similar to 2022 but mixed by country in the architectural coatings business. The integration of Tikkurila will continue, and synergies from recent acquisitions should aid earnings growth. Unfavorable demand trends are expected to continue to impact the packaging, protective and marine, and industrial coatings businesses. We will continue to monitor the impacts of higher energy prices and challenges with respect to energy procurement in Europe and adapt our footprint, as necessary, to best serve our customers. Raw material availability is expected to continue to improve as the year progresses. A new cost savings program was announced in the third quarter 2022, which has a higher concentration of initiatives focused on Europe. We continue to monitor the economic environment in the U.K. as its exit from the European Union progresses, including monitoring the impacts on consumer sentiment, logistics, labor availability and coatings demand. To date, the U.K.'s exit from the European Union has not had a material impact on the Company's operations.

In the Asia Pacific region, we expect economic activity to improve in China after the first quarter as supply chain activity and mobility levels move closer to 2019 levels. Stimulus support is expected in the region to aid economic activity. Economic output in India is expected to remain robust, and activity in Southeast Asia is expected to benefit from the reopening of China’s borders. In China, we expect growth above the global average despite challenges in the real estate market and heightened risks as the Chinese economy continues to rely more on domestic consumption. The growth of China’s electric vehicle subsegment, including significant opportunities for export activity, should benefit the Company’s automotive OEM business. Marine coatings new-build demand is expected to be stable as order books for large vessels and container ships remain close to multi-year highs.

In Latin America, we anticipate continued stable economic conditions in Mexico, most of Central America and South America compared to 2022. We expect continued strong demand in the PPG Comex architectural coatings business.

Significant other factors

We made significant progress on the global restructuring programs that were announced in 2019, 2020 and 2021. The 2019 and 2020 programs have been substantially completed. In the third quarter 2022, the Company approved a business restructuring plan which included actions to reduce its global cost structure in response to current economic conditions. Total restructuring savings, including the impact of acquisition synergies, was approximately $65 million in 2022. Total restructuring savings are expected to be at least $60 million in 2023. We will continue to monitor and aggressively manage the Company’s cost structure to ensure alignment with the overall demand environment.

Raw materials are our most significant input cost. 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.

On an aggregate basis, average raw material costs were significantly higher in 2022 versus 2021. The increases in raw material costs were primarily driven by ongoing supply constraints, including various force majeure declarations, higher energy prices, production outages at many of our suppliers, energy surcharges in Europe, labor availability challenges, transportation shortages and higher ocean freight costs. PPG currently expects raw material costs to be higher by a low-single-digit percentage on a year-over-year basis in the first quarter 2023; however, we expect the negative impact of raw material inflation to lessen as 2023 progresses.

We achieved selling price improvement across all businesses in 2022, reflecting the Company’s efforts to offset various inflationary pressures. The Company will carefully monitor all costs during 2023 and assess the need for additional selling price increases.

In 2022, we experienced unfavorable foreign currency translation throughout the year, and we expect that foreign currency rates will continue to be volatile. However, 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 2023 effective tax rate from continuing operations is expected to be in the range of 22% to 24%, varying by quarter. This range represents the Company’s best estimate.

Net periodic pension expense will be higher in 2023, primarily due to declines in the market value of pension investments during 2022, resulting in a lower asset base to generate returns on plan assets in 2023. The interest cost component of pension expense will also be higher due to an increase in discount rates.

Over the past five years, the Company used over $2 billion of cash to repurchase approximately 21 million shares of PPG stock, including using $190 million to repurchase shares of PPG stock during 2022. The Company ended the year with approximately $1.1 billion remaining under its current share repurchase authorization. During 2022, the Company deployed $114 million for acquisitions, $518 million for capital expenditures and $570 million for dividends. In 2022, PPG marked the 51st annual per share dividend increase and the 123rd successive year of annual dividend payments.

PPG ended 2022 with approximately $1.2 billion in cash and short-term investments. The Company expects strong cash generation in 2023.

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. Refer to Item 3. “Legal Proceedings” and Note 15, “Commitments and Contingent Liabilities” in Item 8 of this Form 10-K for a description of certain of these lawsuits.

As discussed in Item 3 and Note 15, 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.

As also discussed in Note 15, PPG has significant reserves for environmental contingencies. Refer to the Environmental Matters section of Note 15 for details of these reserves. 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.

Accounting Standards Adopted in 2022

Note 1, “Summary of Significant Accounting Policies” in 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” in Item 8 of this Form 10-K describes accounting pronouncements that have been promulgated prior to December 31, 2022 but are not effective until a future date.

Liquidity and Capital Resources

During the past two years, PPG 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)	*2022*	*2021*
Cash and cash equivalents	$1,099	$1,005
Short-term investments	55	67
Total	$1,154	$1,072

Cash from operating activities - continuing operations

($ in millions, except percentages)			*% Change*
	2022	*2021*	*2022 vs. 2021*
Cash from operating activities	$963	$1,562	(38.3)%

2022 vs. 2021

The $599 million decrease in Cash from operating activities - continuing operations was primarily due to a larger increase in working capital in 2022 compared to the prior year, which reflects the impact of higher raw material costs on inventories and higher selling prices on trade receivables.

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. Refer to Note 3, “Working Capital Detail” in 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)	2022	2021
Trade receivables, net	$2,824	$2,687
Inventories, FIFO	2,544	2,345
Trade creditors' liabilities	2,538	2,734
Operating working capital	$2,830	$2,298
Operating working capital as a % of fourth quarter sales, annualized	16.9 %	13.7 %
Trade receivables, net as a % of fourth quarter sales, annualized	16.9 %	16.0 %
Days sales outstanding	56	53
Inventories, FIFO as a % of fourth quarter sales, annualized	15.2 %	14.0 %
Inventory turnover	4.5	4.9

Environmental expenditures

($ in millions)	2022	2021
Cash outlays related to environmental remediation activities	$78	$56

We expect cash outlays for environmental remediation activities in 2023 to be between $40 million and $60 million.

Cash used for investing activities

($ in millions, except percentages)			% Change
	2022	2021	2022 vs. 2021
Cash used for investing activities	$461	$2,404	(80.8)%

2022 vs. 2021

The $1,943 million decrease in cash used for investing activities was primarily due to the Company's prior year acquisition of Tikkurila.

Capital expenditures, including business acquisitions

($ in millions, except percentages)			% Change
	2022	2021	2022 vs. 2021
Capital expenditures (1)	$518	$371	39.6%
Business acquisitions, net of cash balances acquired	$114	$2,137	(94.7)%
Total capital expenditures, including acquisitions	$632	$2,508	(74.8)%
Capital expenditures, excluding acquisitions, as a % of sales	2.9 %	2.2 %	31.8%

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

During 2023, capital expenditures, which are expected to be in the range of $500 million to $550 million, will support future organic growth opportunities. The Company will continue to deploy cash focused on shareholder value creation, with a preference for business acquisitions, coupled with debt reduction to enhance financial flexibility.

Cash (used for)/from financing activities

			% Change
($ in millions, except percentages)	2022	2021	2022 vs. 2021
Cash (used for)/from financing activities	($409)	$93	N/A

2022 vs. 2021

The $502 million change was primarily due to the proceeds from the issuance of long-term debt in 2021 to finance the Company's acquisition of Tikkurila.

Share repurchase activity

($ in millions, except number of shares)	2022	2021
Number of shares repurchased (millions)	1.5	1.3
Cash paid for shares repurchased	$190	$210

The Company has approximately $1.1 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)	***2022***	***2021***
Dividends paid to shareholders	$570	$536

PPG has paid uninterrupted annual dividends since 1899, and 2022 marked the 51st successive year of increased annual per-share dividend payments to shareholders. The Company raised its per-share quarterly dividend by more than 5% to $0.62 per share paid in September 2022.

Debt issued and repaid

Debt Issued (net of premium/discount and issuance costs)	***Year***	***$ in millions***
1.875% notes (€300) due 2025	2022	$319
2.750% notes (€700) due 2029	2022	$742
1.95% note (€50) due 2037	2022	$55
Term Loan Credit Agreement, due 2024	2021	$1,399
$700 million 1.200% Notes due 2026	2021	$692

Debt Repaid	***Year***	***$ in millions***
Term Loan Credit Agreement, due 2024	2022	$300
Acquired debt	2022	$2
0.875% notes (€600)	2021	$677
9% non-callable debentures ($134)	2021	$134
Non-U.S. debt (€30)	2021	$36
Acquired debt	2021	$207
$1.5 billion 364-Day Term Loan	2021	$400

The Company’s commercial paper borrowings are classified as long-term debt based on PPG’s intent and ability to refinance these borrowings on a long-term basis. Net payments on commercial paper were $440 million for the year ended December 31, 2022. Net proceeds from commercial paper were $190 million for the year ended December 31, 2021.

Credit agreements and lines of credit

In February 2021, PPG entered into a $2.0 billion Term Loan Credit Agreement (the "Term Loan Credit Agreement"). The Term Loan Credit Agreement provided the Company with the ability to borrow up to an aggregate principal amount $2.0 billion on an unsecured basis prior to December 31, 2021 as further discussed in Note 10, "Borrowings and Lines of Credit" in Item 8 of this Form 10-K. In June 2021, PPG borrowed $700 million under the $2.0 billion Term Loan Credit Agreement. In December 2021, PPG borrowed an additional $700 million under the Term Loan Credit Agreement. In 2022, PPG repaid $300 million of the Term Loan Credit Agreement using cash on hand.

In August 2019, PPG amended and restated its five-year credit agreement (the “Credit Agreement”) with several banks and financial institutions as further discussed in Note 10, "Borrowings and Lines of Credit" in Item 8 of this Form 10-K. The Credit Agreement amends and restates the Company's existing five year credit agreement dated as of December 18, 2015. The Credit Agreement provides for a $2.2 billion unsecured revolving credit facility. The Credit Agreement will terminate on August 30, 2024. There were no amounts outstanding under the credit agreement as of December 31, 2022 and December 31, 2021.

The Term Loan Credit Agreement and Credit Agreement require the Company to maintain a ratio of Total Indebtedness to Total Capitalization, as defined in the Term Loan Credit Agreement and Credit Agreement, of 60% or less; provided, that for any fiscal quarter in which the Company has made an acquisition for consideration in excess of $1 billion and for the next five fiscal quarters thereafter, the ratio of Total Indebtedness to Total Capitalization may not exceed 65% at any time. As of December 31, 2022, Total Indebtedness to Total Capitalization as defined under the Credit Agreement and the Term Loan was 49%.

In addition to the amounts available under 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.

Refer to Note 10, “Borrowings and Lines of Credit” in 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 and debt covenants.

Cash Requirements

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 cash requirements. The Company's significant cash requirements include the following contractual obligations and commitments.

		Obligations Due In:			
($ in millions)	Total	2023	2024-2025	2026-2027	Thereafter
Long-term debt	$6,806	$303	$2,355	$1,340	$2,808
Interest payments(1)	$1,238	$191	$312	$224	$511
Operating leases(2)	$893	$201	$295	$178	$219
Unconditional purchase commitments(3)	$262	$100	$106	$43	$13

(1) Interest on all outstanding debt.

(2) Includes interest payments.

(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.

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

Other liquidity matters

At December 31, 2022, 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 $162 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 if, or when, any significant cash settlements with taxing authorities may occur.

Critical Accounting Estimates

Management has evaluated the accounting policies used in the preparation of the financial statements and related notes presented in 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 15, "Commitments and Contingent Liabilities" and Note 13, "Income Taxes" in 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. Refer to Note 14, "Employee Benefit Plans" in Item 8 of this Form 10-K for information on these plans and the assumptions used.

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 is recognized as goodwill. The valuations of the acquired assets and liabilities impacts 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 acquired intangible assets have indefinite lives and in determining the useful lives of acquired 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 by either performing a qualitative evaluation or a quantitative test at least annually, or more frequently if an indication of impairment arises. The qualitative evaluation is an assessment of factors to determine whether it is more likely than not that the fair value of a reporting unit or asset is less than its carrying amount. In the quantitative test, fair values are estimated using a discounted cash flow model. Key assumptions and estimates used in the discounted cash flow model include discount rates, tax rates, future revenues, operating cash flows and capital expenditures. For more information on these matters, see Note 1, “Summary of Significant Accounting Policies” in Item 8 of this Form 10-K.

We believe that the amounts recorded in the financial statements in 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 spot exchange rates at December 31, 2022 and at December 31, 2021, the U.S. dollar strengthened against the currencies of many countries within the regions where PPG operates, most notably the Chinese yuan, the euro, and the British pound. As a result, consolidated net assets at December 31, 2022 decreased by $266 million from December 31, 2021.

Comparing average exchange rates during 2022 to those of 2021, the U.S. dollar strengthened against the currencies of many countries within the regions PPG operates, including most of the countries in the EMEA region. This had an unfavorable impact of approximately $86 million on full year 2022 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 SEC. 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 statements related to the expected effects on our business of COVID-19, global economic conditions, geopolitical issues in Europe, increasing price and product competition by our competitors, fluctuations in cost and availability of raw materials, energy, labor and logistics, the ability to achieve selling price increases, the ability to recover margins, customer inventory levels, PPG 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, the timing and expected benefits of our acquisitions, difficulties in integrating acquired businesses and achieving expected synergies therefrom, the amount of future share repurchases, 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 unpredictability of existing and possible future litigation, including asbestos litigation, and government investigations. However, it is not possible to predict or identify all such factors.

Consequently, while the list of factors presented here and in 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. PPG undertakes no obligation to update any forward-looking statement, except as otherwise required by applicable law.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

PPG is exposed to market risks related to changes in foreign currency exchange rates and interest rates. 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 11, “Financial Instruments, Hedging Activities and Fair Value Measurements” in 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 could 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. Certain foreign currency forward contracts outstanding during 2022 and 2021 served as a hedge of a portion of PPG’s exposure to foreign currency transaction risk. The fair value of these contracts was a net asset of $24 million as of both December 31, 2022 and December 31, 2021. 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, 2022 and 2021 would have been $304 million and $306 million, respectively.

As of both December 31, 2022 and December 31, 2021, PPG had U.S. dollar to euro cross currency swap contracts with notional amounts of $775 million. The fair value of these contracts were net assets of $88 million and $50 million as of December 31, 2022 and 2021, respectively. A 10% increase in the value of the euro to the U.S. dollar would have had an unfavorable effect on the fair value of these swap contracts by reducing the value of these instruments by $73 million and $77 million at December 31, 2022 and 2021, respectively.

As of December 31, 2022 and 2021, PPG had non-U.S. dollar denominated debt outstanding of $2.6 billion and $1.6 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 $293 million and $178 million as of December 31, 2022 and 2021, 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. PPG has interest rate swaps which converted $525 million of fixed rate debt to variable rate debt. The fair values of these contracts was a liability of $20 million and an asset of $36 million as of December 31, 2022 and 2021, respectively. An increase in variable interest rates of 10% would have lowered the fair values of these swaps and increased interest expense by $7 million and $1 million for the periods ended December 31, 2022 and 2021. 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 increased annual interest expense associated with PPG's variable rate debt obligations by $4 million and by less than $1 million for the periods ended December 31, 2022 and 2021, respectively. Further, a 10% reduction in interest rates would have increased the fair value of the Company’s fixed rate debt by approximately $116 million and $56 million as of December 31, 2022 and 2021, respectively; however, such changes would not have had an effect on PPG’s annual Income before income taxes or cash flows.

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 sheet of PPG Industries, Inc. and its subsidiaries (the "Company") as of December 31, 2022 and 2021, and the related consolidated statements of income, of comprehensive income, of shareholders' equity and of cash flows for each of the three years in the period ended December 31, 2022, including the related notes and schedule of valuation and qualifying accounts for each of the three years in the period ended December 31, 2022 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, 2022, 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, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022 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, 2022, 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. 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.

Critical Audit Matters

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that (i) relates to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Quantitative Goodwill Impairment Test

As described in Notes 1 and 6 to the consolidated financial statements, the Company's consolidated goodwill balance was $6,078 million as of December 31, 2022, of which a portion was subject to a quantitative goodwill impairment test. Management tests goodwill for impairment by either performing a qualitative evaluation or a quantitative test, at least annually, or more frequently if an indication of impairment exists. Management's quantitative goodwill impairment testing, if deemed necessary, is performed during the fourth quarter of each year by comparing the estimated fair value of an associated reporting unit as of September 30 to its carrying value. Fair value is estimated using a discounted cash flow model. Key assumptions and estimates used in the discounted cash flow model include projected future revenues, discount rates, operating cash flows, capital expenditures and tax rates.

The principal considerations for our determination that performing procedures relating to the quantitative goodwill impairment test is a critical audit matter are (i) the significant judgment by management when developing the fair value estimate of the reporting unit where a quantitative test was performed; and (ii) a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating management's significant assumption related to projected future revenues.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to management's quantitative goodwill impairment test, including controls over the valuation of the reporting unit where a quantitative test was performed. These procedures also included, among others (i) testing management's process for developing the fair value estimate of the reporting unit where a quantitative test was performed; (ii) evaluating the appropriateness of the discounted cash flow model; (iii) testing the completeness and accuracy of underlying data used in the discounted cash flow model; and (iv) evaluating the reasonableness of management's significant assumption related to projected future revenues. Evaluating management's significant assumption related to projected future revenues involved evaluating whether the significant assumption used by management was reasonable considering (i) the current and past performance of the reporting unit; (ii) the consistency with external market and industry data; and (iii) whether the assumption was consistent with evidence obtained in other areas of the audit.

/s/ PricewaterhouseCoopers LLP

Pittsburgh, Pennsylvania
February 16, 2023
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, 2022. 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, 2022, the Company's internal control over financial reporting were effective.

PricewaterhouseCoopers LLP, an independent registered public accounting firm, has issued their report, included on pages 30-31 of this Form 10-K, regarding the Company's internal control over financial reporting.

/s/ Timothy M. Knavish

Timothy M. Knavish
Director, President and Chief Executive Officer
February 16, 2023

/s/ Vincent J. Morales

Vincent J. Morales
Senior Vice President and Chief Financial Officer
February 16, 2023

Consolidated Statement of Income

	For the Year		
($ in millions, except per share amounts)	*2022*	*2021*	*2020*
Net sales	$17,652	$16,802	$13,834
Cost of sales, exclusive of depreciation and amortization	11,096	10,286	7,777
Selling, general and administrative	3,842	3,780	3,389
Depreciation	388	389	371
Amortization	166	172	138
Research and development, net	448	439	379
Interest expense	167	121	138
Interest income	(54)	(26)	(23)
Impairment and other related charges, net	245	21	93
Pension settlement charge	—	50	—
Asbestos-related claims reserve adjustment	—	(133)	—
Business restructuring, net	33	31	174
Other (income)/charges, net	(60)	(143)	36
Income before income taxes	$1,381	$1,815	$1,362
Income tax expense	325	374	291
Income from continuing operations	$1,056	$1,441	$1,071
(Loss)/income from discontinued operations, net of tax	(2)	19	3
Net income attributable to the controlling and noncontrolling interests	$1,054	$1,460	$1,074
Less: Net income attributable to noncontrolling interests	28	21	15
Net income (attributable to PPG)	$1,026	$1,439	$1,059
Amounts attributable to PPG			
Income from continuing operations, net of tax	$1,028	$1,420	$1,056
(Loss)/income from discontinued operations, net of tax	(2)	19	3
Net income (attributable to PPG)	$1,026	$1,439	$1,059
Earnings per common share			
Income from continuing operations, net of tax	$4.35	$5.98	$4.46
(Loss)/income from discontinued operations, net of tax	(0.01)	0.08	0.01
Net income (attributable to PPG)	$4.34	$6.06	$4.47
Earnings per common share - assuming dilution			
Income from continuing operations, net of tax	$4.33	$5.93	$4.44
(Loss)/income from discontinued operations, net of tax	(0.01)	0.08	0.01
Net income (attributable to PPG)	$4.32	$6.01	$4.45

Consolidated Statement of Comprehensive Income

	For the Year		
($ in millions)	*2022*	*2021*	*2020*
Net income attributable to the controlling and noncontrolling interests	$1,054	$1,460	$1,074
Other comprehensive income/(loss), net of tax			
Defined benefit pension and other postretirement benefits	206	174	(213)
Unrealized foreign currency translation adjustments	(279)	(330)	(36)
Other comprehensive loss, net of tax	(73)	(156)	(249)
Total comprehensive income	$981	$1,304	$825
Less: amounts attributable to noncontrolling interests:			
Net income	(28)	(21)	(15)
Unrealized foreign currency translation adjustments	13	5	—
Comprehensive income attributable to PPG	$966	$1,288	$810

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

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Consolidated Balance Sheet

	December 31	
($ in millions)	*2022*	*2021*
Assets		
Current assets		
Cash and cash equivalents	$1,099	$1,005
Short-term investments	55	67
Receivables	3,303	3,152
Inventories	2,272	2,171
Other current assets	444	379
Total current assets	$7,173	$6,774
Property, plant and equipment, net	3,328	3,442
Goodwill	6,078	6,248
Identifiable intangible assets, net	2,414	2,783
Deferred income taxes	95	197
Investments	244	274
Operating lease right-of-use assets	829	891
Other assets	583	742
Total	$20,744	$21,351
Liabilities and Shareholders' Equity		
Current liabilities		
Accounts payable and accrued liabilities	$4,087	$4,392
Restructuring reserves	138	173
Short-term debt and current portion of long-term debt	313	9
Current portion of operating lease liabilities	183	192
Total current liabilities	$4,721	$4,766
Long-term debt	6,503	6,572
Operating lease liabilities	636	693
Accrued pensions	566	834
Other postretirement benefits	476	672
Deferred income taxes	501	646
Other liabilities	632	757
Total liabilities	$14,035	$14,940
Commitments and contingent liabilities (See Note 15)		
Shareholders' equity		
Common stock	$969	$969
Additional paid-in capital	1,130	1,081
Retained earnings	20,828	20,372
Treasury stock, at cost	(13,525)	(13,386)
Accumulated other comprehensive loss	(2,810)	(2,750)
Total PPG shareholders' equity	$6,592	$6,286
Noncontrolling interests	117	125
Total shareholders' equity	$6,709	$6,411
Total	$20,744	$21,351

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	Total PPG	Noncontrolling Interests	Total
January 1, 2020	$969	$950	$18,906	($13,191)	($2,350)	$5,284	$119	$5,403
Net income attributable to controlling and noncontrolling interests	—	—	1,059	—	—	1,059	15	1,074
Other comprehensive loss, net of tax	—	—	—	—	(249)	(249)	—	(249)
Cash dividends	—	—	(496)	—	—	(496)	—	(496)
Issuance of treasury stock	—	45	—	33	—	78	—	78
Stock-based compensation activity	—	13	—	—	—	13	—	13
Dividends paid on subsidiary common stock to noncontrolling interests	—	—	—	—	—	—	(4)	(4)
Reductions in noncontrolling interests	—	—	—	—	—	—	(4)	(4)
December 31, 2020	$969	$1,008	$19,469	($13,158)	($2,599)	$5,689	$126	$5,815
Net income attributable to controlling and noncontrolling interests	—	—	1,439	—	—	1,439	21	1,460
Other comprehensive loss, net of tax	—	—	—	—	(151)	(151)	(5)	(156)
Cash dividends	—	—	(536)	—	—	(536)	—	(536)
Purchase of treasury stock	—	—	—	(250)	—	(250)	—	(250)
Issuance of treasury stock	—	48	—	22	—	70	—	70
Stock-based compensation activity	—	25	—	—	—	25	—	25
Dividends paid on subsidiary common stock to noncontrolling interests	—	—	—	—	—	—	(6)	(6)
Reductions in noncontrolling interests	—	—	—	—	—	—	(11)	(11)
December 31, 2021	$969	$1,081	$20,372	($13,386)	($2,750)	$6,286	$125	$6,411
Net income attributable to controlling and noncontrolling interests	—	—	1,026	—	—	1,026	28	1,054
Other comprehensive loss, net of tax	—	—	—	—	(60)	(60)	(13)	(73)
Cash dividends	—	—	(570)	—	—	(570)	—	(570)
Purchase of treasury stock	—	—	—	(150)	—	(150)	—	(150)
Issuance of treasury stock	—	36	—	11	—	47	—	47
Stock-based compensation activity	—	10	—	—	—	10	—	10
Dividends paid on subsidiary common stock to noncontrolling interests	—	—	—	—	—	—	(13)	(13)
Reductions in noncontrolling interests	—	—	—	—	—	—	(10)	(10)
Other	—	3	—	—	—	3	—	3
December 31, 2022	$969	$1,130	$20,828	($13,525)	($2,810)	$6,592	$117	$6,709

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

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Consolidated Statement of Cash Flows

	For the Year		
($ in millions)	*2022*	*2021*	*2020*
Operating activities			
Income from continuing operations	$1,056	$1,441	$1,071
Adjustments to reconcile net income to cash from operations:			
Depreciation and amortization	554	561	509
Asbestos-related claims reserve adjustment	—	(133)	—
Business restructuring, net	33	31	174
Impairment and other related charges, net	245	21	93
Stock-based compensation expense	35	57	44
Deferred income taxes	(157)	35	(47)
Cash contributions to pension plans	(11)	(10)	(17)
Cash used for restructuring actions	(85)	(77)	(126)
Change in certain asset and liability accounts (net of acquisitions):			
Receivables	(268)	(63)	187
Inventories	(227)	(279)	111
Other current assets	(60)	32	49
Accounts payable and accrued liabilities	(8)	295	127
Noncurrent assets and liabilities, net	(136)	(109)	(25)
Taxes and interest payable	143	(64)	(108)
Other	(151)	(176)	88
Cash from operating activities	$963	$1,562	$2,130
Investing activities			
Capital expenditures	($518)	($371)	($304)
Business acquisitions, net of cash balances acquired	(114)	(2,137)	(1,169)
Proceeds from asset sales	117	47	—
Other	54	57	26
Cash used for investing activities	($461)	($2,404)	($1,447)
Financing activities			
Proceeds from Term Loan Credit Agreement, net of fees	$—	$1,399	$—
Repayment of Term Loan Credit Agreement	(300)	—	—
Net (payments on)/proceeds from commercial paper and short-term debt	(439)	190	150
Proceeds from Term Loan, net of fees	—	—	1,497
Repayment of Term Loan	—	(400)	(1,100)
Proceeds from revolving credit facility	—	—	800
Repayment of revolving credit facility	—	—	(800)
Proceeds from the issuance of debt, net of discounts and fees	1,116	692	415
Repayment of long-term debt	—	(847)	(500)
Repayment of acquired debt	(2)	(207)	(13)
Purchase of treasury stock	(190)	(210)	—
Dividends paid on PPG common stock	(570)	(536)	(496)
Other	(24)	12	(12)
Cash (used for)/from financing activities	($409)	$93	($59)
Effect of currency exchange rate changes on cash and cash equivalents	1	(72)	6
Cash reclassified to assets held for sale	—	—	(20)
Net increase/(decrease) in cash and cash equivalents	$94	($821)	$610
Cash and cash equivalents, beginning of year	$1,005	$1,826	$1,216
Cash and cash equivalents, end of year	$1,099	$1,005	$1,826

Supplemental disclosures of cash flow information:			
Interest paid, net of amount capitalized	$156	$140	$153
Taxes paid, net of refunds	$452	$491	$367
Supplemental disclosure of noncash investing and financing activities:			
Capital expenditures accrued within Accounts payable and accrued liabilities at year-end	$76	$163	$37
Purchases of treasury stock transacted but not yet settled	$—	$40	$—

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

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 areas such 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 charged to expense as incurred and totaled $252 million, $243 million and $223 million in 2022, 2021 and 2020, respectively.

Research and Development

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

($ in millions)	*2022*	*2021*	*2020*
Research and development – total	$470	$463	$401
Less: depreciation on research facilities	22	24	22
Research and development, net	$448	$439	$379

Legal Costs

Legal costs, which 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 is provided against deferred tax assets in situations where 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. Refer to Note 3, "Working Capital Detail" for further information concerning the Company's inventories.

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 is 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. Accelerated 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 finance lease 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. Refer to Note 4, “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 10 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 or more frequently if an indication of impairment exists. 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 value 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. Quantitative goodwill impairment testing, if deemed necessary, is performed during the fourth quarter of each year by comparing the estimated fair value of an associated reporting unit as of September 30 to its carrying value. Fair value is estimated using a discounted cash flow model. Key assumptions and estimates used in the discounted cash flow model include projected future revenues, discount rates, operating cash flows, capital expenditures and tax rates. In 2022, the annual impairment testing review of goodwill did not result in impairment of the Company’s reporting units.

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. In the first quarter 2022, due to the adverse economic impacts of Russian military forces invading Ukraine, the Company identified indicators that the carrying value of an indefinite-lived intangible asset and certain definite-lived intangible assets associated with the Company's operations in Russia may not be recoverable as of March 31, 2022, and the carrying value of those assets was assessed for impairment. As a result of this assessment, the Company recorded impairment charges of $124 million related to the indefinite-lived intangible asset and $23 million related to definite-lived intangible assets in the consolidated statement of income for the year ended December 31, 2022. Refer to Note 7, "Impairment and Other Related Charges, Net" for additional information.

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. In 2022, the annual impairment testing review of indefinite-lived intangibles performed as of September 30, 2022 resulted in the Company recognizing a pretax impairment charge of $4 million. Refer to Note 6, “Goodwill and Other Identifiable Intangible Assets” for further details.

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 doubtful accounts 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 regional economic and market conditions, the aging of accounts receivable, assessments of current creditworthiness of customers, and forward-looking information. Refer to Note 20, "Revenue Recognition" for further details.

Leases

The Company determines if a contract is a lease at the inception of the arrangement. The Company reviews all options to extend, terminate, or purchase its right of use assets at the inception of the lease and accounts for these options when they are reasonably certain of being exercised. Certain real estate leases contain lease and non-lease components, which are accounted for separately. For certain equipment leases, lease and non-lease components are accounted for as a single lease component.

Leases with an initial term of 12 months or less are not recorded on the consolidated balance sheet. Lease expense for these leases is recognized on a straight-line basis over the lease term.

Variable lease expense is based on contractual arrangements with PPG's lessors determined based on external indices or other relevant market factors. In addition, PPG's variable lease expense also includes elements of a contract that do not represent a good or service but for which the lessee is responsible for paying.

Nearly all of PPG's lease contracts do not provide a readily determinable implicit rate. For these contracts, PPG's estimated incremental borrowing rate is based on information available at the inception of the lease.

Product Warranties

The Company accrues for product warranties at the time the associated products are sold based on historical claims experience. The reserve, pretax 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 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 $23 million and $22 million as of December 31, 2022 and 2021, 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.

Environmental Contingencies

It is PPG's policy to accrue expenses for environmental 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.

Assets and Liabilities Held for Sale

The Company classifies assets and liabilities as held for sale (a "disposal group") when management commits to a plan to sell the disposal group, the sale is probable within one year and the disposal group is available for immediate sale in its present condition. The Company considers various factors, particularly whether actions required to complete the plan indicate it is unlikely that significant changes to the plan will be made or the plan will be withdrawn. Assets held for sale are measured at the lower of carrying value or fair value less costs to sell. Any loss resulting from the measurement is recognized in the period the held-for-sale criteria are met. Conversely, gains are not recognized until the date of the sale. When the disposal group is classified as held for sale, depreciation and amortization ceases and the Company tests the assets for impairment.

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 2022

Effective January 1, 2022, PPG adopted Accounting Standards Update ("ASU") No. 2020-06, "Debt - Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging - Contracts in Entity's Own Equity (Subtopic 815-40)." This ASU simplifies the accounting for certain financial instruments with characteristics of liabilities and equity, including convertible instruments and contracts in an entity's own equity. Adoption of this standard did not materially impact PPG's consolidated financial position, results of operations or cash flows.

In March 2020, the FASB issued ASU No. 2020-04, “Reference Rate Reform." This ASU provided optional expedients and exceptions to U.S. GAAP for a limited period of time to ease potential accounting impacts associated with transitioning away from reference rates that are expected to be discontinued, such as the London Interbank Offered Rate ("LIBOR"). The amendments in this ASU applied only to contracts, hedging relationships, and other transactions that referenced LIBOR or another reference rate expected to be discontinued. The amendments in this ASU were effective through December 31, 2022. PPG did not apply any of the optional expedients or exceptions allowed under this ASU.

Accounting Standards to be Adopted in Future Years

There were no accounting pronouncements promulgated prior to December 31, 2022 that are not effective until a future date which are expected to have a material impact on PPG’s consolidated financial position, results of operations or cash flows.

2. Acquisitions

The pro-forma impact of the following acquisitions on PPG’s sales and results of operations, including the pro-forma effect of events that are directly attributable to each acquisition, was not significant.

Tikkurila

On June 10, 2021, PPG completed its tender offer for all of the outstanding shares of Tikkurila Oyj ("Tikkurila"). Tikkurila is a leading Nordic producer and distributor of decorative paint and coatings, including an industrial paint business that produces paints and coatings for the wood and metal industries, among others. Immediately prior to the June 10, 2021 acquisition date, PPG owned 9.3% of Tikkurila’s issued and outstanding shares. Immediately following the acquisition date, PPG owned 97.1% of Tikkurila’s issued and outstanding shares. PPG continued to acquire the remaining shares not tendered during the tender offer period through a squeeze out process, ultimately achieving 100% ownership of Tikkurila’s outstanding shares during the fourth quarter of 2021.

The results of this business since the date of acquisition have been reported within two operating segments: the architectural coatings – EMEA business and the industrial coatings business. The architectural coatings – EMEA business is included within the Performance Coatings reportable business segment and the industrial coatings business is included within the Industrial Coatings reportable business segment.

Ennis-Flint

On December 23, 2020, PPG completed the acquisition of Ennis-Flint, a global manufacturer of a broad portfolio of pavement marking products, including traffic paint, hot-applied and preformed thermoplastics and raised pavement markers. PPG funded this transaction using cash on hand. The results of this business since the date of acquisition have been reported within the traffic solutions business within the Performance Coatings reportable business segment.

3. Working Capital Detail

($ in millions)	2022	2021
Receivables		
Trade - net	$2,824	$2,687
Other - net	479	465
Total	$3,303	$3,152
Inventories[(1)]		
Finished products	$1,209	$1,175
Work in process	238	234
Raw materials	784	723
Supplies	41	39
Total	$2,272	$2,171
Accounts payable and accrued liabilities		
Trade	$2,538	$2,734
Accrued payroll	501	534
Customer rebates	377	368
Other postretirement and pension benefits	77	87
Income taxes	37	36
Other	557	633
Total	$4,087	$4,392

(1) Inventories valued using the LIFO method of inventory valuation comprised 21% and 29% of total gross inventory values as of December 31, 2022 and 2021, respectively. If the FIFO method of inventory valuation had been used, inventories would have been $272 million and $174 million higher as of December 31, 2022 and 2021, respectively.

4. Property, Plant and Equipment

($ in millions)	Useful Lives (years)	2022	2021
Land and land improvements	1-30	$548	$570
Buildings	20-40	1,774	1,769
Machinery and equipment	5-25	3,960	3,949
Other	3-20	1,203	1,177
Construction in progress		492	509
Total		$7,977	$7,974
Less: accumulated depreciation		4,649	4,532
Net		$3,328	$3,442

5. Investments

($ in millions)	2022	2021
Investments in equity affiliates	$134	$126
Marketable equity securities (See Note 11)	61	98
Other	49	50
Total	$244	$274

Investments in equity affiliates represent PPG’s ownership interests in entities between 20% and 50% that manufacture and sell coatings and certain chemicals.

PPG’s share of undistributed net earnings of equity affiliates was $25 million, $15 million and $8 million in 2022, 2021 and 2020, respectively. Dividends received from equity affiliates were $17 million, $9 million and $18 million in 2022, 2021 and 2020, respectively.

6. Goodwill and Other Identifiable Intangible Assets

Goodwill

($ in millions)	Performance Coatings	Industrial Coatings	Total
January 1, 2021	$4,023	$1,079	$5,102
Acquisitions, including purchase accounting adjustments	1,188	177	1,365
Foreign currency impact	(177)	(42)	(219)
December 31, 2021	$5,034	$1,214	$6,248
Acquisitions, including purchase accounting adjustments	31	15	46
Divestitures	(40)	—	(40)
Foreign currency impact	(144)	(32)	(176)
December 31, 2022	$4,881	$1,197	$6,078

Identifiable Intangible Assets

	December 31, 2022			December 31, 2021		
($ in millions)	Gross Carrying Amount	Accumulated Amortization	Net	Gross Carrying Amount	Accumulated Amortization	Net
Indefinite-Lived Identifiable Intangible Assets						
Trademarks	$1,325	$—	$1,325	$1,449	$—	$1,449
Definite-Lived Identifiable Intangible Assets						
Acquired technology	$827	($636)	$191	$862	($616)	$246
Customer-related	1,855	(1,112)	743	1,956	(1,064)	892
Trade names	311	(158)	153	336	(144)	192
Other	50	(48)	2	51	(47)	4
Total Definite Lived Intangible Assets	$3,043	($1,954)	$1,089	$3,205	($1,871)	$1,334
Total Identifiable Intangible Assets	$4,368	($1,954)	$2,414	$4,654	($1,871)	$2,783

In the first quarter 2022, due to the adverse economic impacts of the Russian invasion in Ukraine, the Company recognized $147 million of Impairment and other related charges, net in the consolidated statement of income related to certain definite-lived and indefinite-lived intangible assets in the Performance Coatings segment. Refer to Note 7, “Impairment and Other Related Charges, Net” for further details.

In the fourth quarter, the Company tests the carrying value of indefinite-lived trademarks for impairment, as discussed in Note 1, “Summary of Significant Accounting Policies.” In conjunction with both the 2022 and 2020 annual impairment assessments, the long-term forecast of net sales for certain trademarks in the Performance Coatings segment was reduced as a result of historical performance, resulting in recognition of pretax impairment charges of $4 million and $38 million, respectively, in Impairment and other related charges, net in the accompanying consolidated statements of income. In 2021, the annual impairment testing review of indefinite-lived intangibles did not result in an impairment.

Aggregate amortization expense was $166 million, $172 million and $138 million in 2022, 2021 and 2020, respectively.

($ in millions)	2023	2024	2025	2026	2027
Estimated future amortization expense	$150	$127	$115	$93	$85

7. Impairment and Other Related Charges, Net

Wind Down of Russia Operations

In the first quarter 2022, Russian military forces invaded Ukraine. This military action had significant and immediate adverse economic impacts on businesses operating in Russia and Ukraine. Based on deteriorating business conditions and regulatory restrictions, including the impact of economic sanctions imposed on Russia by the United States, the European Union and other governments, PPG immediately ceased sales to Russian state-owned entities, announced that the Company would cease all new investments in Russia and commenced actions to wind down most of the Company’s operations in Russia.

Based on this change in facts and circumstances, the long-term cash flow forecast for the Company’s operations in Russia was significantly reduced. This reduction in the long-term cash flow forecast indicated that the carrying amounts of long-lived assets and certain indefinite-lived intangible assets associated with the Company’s operations in Russia may not be recoverable, and the carrying value of these assets was tested for impairment. Additionally, the Company evaluated trade receivables for estimated future credit losses, inventories for declines in net realizable value and other current assets for impairment in light of the deteriorating economic conditions in Russia and Ukraine. As a result, during the three months ended March 31, 2022, the Company recognized $290 million of Impairment and other related charges, net in the consolidated statement of income, comprised of $201 million of long-lived asset impairment charges and $89 million of other related charges.

The $201 million of long-lived asset impairment charges recorded during first quarter 2022 was comprised of $124 million related to indefinite-lived intangible assets, $54 million related to property, plant and equipment, net and $23 million related to definite-lived intangible assets. The $89 million of other related charges represented reserves established for receivables and other current assets and the write-down of inventories impacted by the adverse economic consequences of the Russian invasion of Ukraine.

Subsequently, the Company released a portion of the previously established reserves due to the collection of certain trade receivables and recorded recoveries due to the realization of certain previously written-down inventories, resulting in recognition of income of $63 million within Impairment and other related charges, net.

The Company continues to consider actions to exit Russia, including a possible sale of its Russian business or controlled withdrawal from the Russia market.

During both the years ended December 31, 2022 and 2021, net sales in Russia represented approximately 1% of PPG net sales.

Businesses Classified as Held for Sale

The Company recorded impairment charges of $14 million, $21 million and $52 million in Impairment and other related charges, net in the consolidated statement of income for the years ended December 31, 2022, 2021 and 2020, respectively, related to certain smaller, non-strategic businesses. PPG committed to plans to sell these business and they were reclassified as held for sale. The revenue of these businesses represents less than 1% of PPG annual net sales. The impairment charges recorded represent the excess net book value of the net assets over the anticipated sales proceeds less costs to sell.

8. Business Restructuring

The Company records restructuring liabilities that represent charges incurred in connection with consolidations of certain operations, including operations from acquisitions, as well as headcount reduction programs. These charges consist primarily of severance costs and certain other cash costs. As a result of these programs, the Company will also incur incremental non-cash accelerated depreciation expense for certain assets due to their reduced expected asset life. These charges are not allocated to the Company's reportable business segments. Refer to Note 21, "Reportable Business Segment Information" for additional information.

In the third quarter 2022, the Company approved a business restructuring plan which included actions to reduce its global cost structure in response to current economic conditions, including softening demand in Europe and lower than expected demand recovery in China. The Company performed a comprehensive evaluation to identify opportunities to reduce costs and improve the profitability of the overall business portfolio. The program includes actions to right-size employee headcount, reductions in functional and administrative costs and other cost savings actions. The majority of these restructuring actions are expected to be completed by the end of 2023.

In the fourth quarter 2021, the Company approved business restructuring actions related to recent acquisitions targeting further consolidation of its manufacturing footprint and headcount reductions. The majority of these restructuring actions are expected to be completed by the end of 2023.

In the second quarter 2020, the Company approved a business restructuring plan which included actions to reduce its global cost structure. The program addressed weakened global economic conditions stemming from the pandemic and related pace of recovery in a few end-use markets along with further opportunities to optimize supply chain and functional costs. In the second quarter 2019, the Company approved a business restructuring plan which included actions to reduce its global cost structure. Substantially all actions of the 2020 and 2019 restructuring programs have been completed.

The following table summarizes restructuring reserve activity for the years ended December 31, 2022 and 2021:

	Total Reserve	
($ in millions)	***2022***	***2021***
January 1	$231	$293
Approved restructuring actions	84	54
Release of prior reserves and other adjustments[(a)]	(51)	(23)
Cash payments	(85)	(77)
Foreign currency impact	(10)	(16)
December 31	$169	$231

(a) Certain releases were recorded to reflect the current estimate of costs to complete planned business restructuring actions.

9. Leases

PPG leases certain retail paint stores, warehouses, distribution facilities, office space, fleet vehicles and equipment.

The components of lease expense for the years ended December 31, 2022, 2021 and 2020 were as follows:

($ in millions)	Classification in the Consolidated Statement of Income	2022	2021	2020
Operating lease cost	Cost of sales, exclusive of depreciation and amortization	$43	$41	$34
Operating lease cost	Selling, general and administrative	216	219	206
Total operating lease cost		$259	$260	$240
Finance lease cost:				
Amortization of right-of-use assets	Depreciation	$2	$2	$2
Interest on lease liabilities	Interest expense	1	1	1
Total finance lease cost		$3	$3	$3
Total lease cost		$262	$263	$243

Total operating lease cost for the years ended December 31, 2022, 2021 and 2020 is inclusive of the following:

($ in millions)	2022	2021	2020
Variable lease costs	$18	$18	$17
Short-term lease costs	$22	$16	$8

The lease amounts included in the consolidated balance sheet as of December 31, 2022 and 2021 were as follows:

($ in millions)	Classification on the Consolidated Balance Sheet	2022	2021
Assets:			
Operating	Operating lease right-of-use assets	$829	$891
Finance(1)	Property, plant, and equipment, net	15	13
Total leased assets		$844	$904
Liabilities:			
Current			
Operating	Current portion of operating lease liabilities	$183	$192
Finance	Short-term debt and current portion of long-term debt	3	3
Noncurrent			
Operating	Operating lease liabilities	$636	$693
Finance	Long-term debt	7	7
Total lease liabilities		$829	$895

(1) Net of accumulated depreciation of $14 million and $13 million as of December 31, 2022 and 2021, respectively.

Supplemental cash flow information related to leases for the years ended December 31, 2022, 2021 and 2020 was as follows:

($ in millions)	2022	2021	2020
Cash paid for amounts included in the measurement of lease liabilities:			
Operating cash flows paid for operating leases	$218	$224	$212
Operating cash flows paid for finance leases	$1	$1	$1
Financing cash flows paid for finance leases	$2	$3	$2
Right-of-use assets obtained in exchange for lease obligations:			
Operating leases	$161	$253	$227
Finance leases	$3	$—	$4

Lease terms and discount rates as of December 31, 2022, 2021 and 2020 were as follows:

	2022	2021	2020
Weighted-average remaining lease term (in years)			
Operating leases	6.7	7.1	7.4
Finance leases	9.0	6.4	6.1
Weighted-average discount rate			
Operating leases	2.6 %	2.1 %	2.4 %
Finance leases	5.7 %	5.8 %	7.0 %

As of December 31, 2022, maturities of lease liabilities were as follows:

($ in millions)	Operating Leases	Finance Leases
2023	$201	$3
2024	166	2
2025	129	2
2026	100	1
2027	78	1
Thereafter	219	3
Total lease payments	$893	$12
Less: Interest	74	2
Total lease obligations	$819	$10

10. Borrowings and Lines of Credit

Long-term Debt Obligations

($ in millions)	Maturity Date	2022	2021
3.2% notes ($300)(1)	2023	$300	$299
Term Loan Credit Agreement, due 2024 ($1,400)	2024	1,099	1,399
2.4% notes ($300)	2024	299	298
0.875% notes (€600)	2025	639	677
1.875% notes (€300)	2025	319	—
1.200% notes ($700)	2026	694	692
1.4% notes (€600)	2027	638	677
3.75% notes ($800)(2)	2028	809	811
2.5% notes (€80)	2029	85	90
2.8% notes ($300)	2029	298	298
2.750% notes (€700)	2029	743	—
2.55% notes ($300)	2030	297	296
1.95% note (€50)	2037	52	—
7.70% notes ($176)	2038	174	174
5.5% notes ($250)	2040	247	247
3.0% notes (€120)	2044	122	130
Commercial paper	Various	—	440
Various other non-U.S. debt(3)	Various	1	1
Finance lease obligations	Various	10	10
Impact of derivatives on debt(4)	N/A	(20)	36
Total		$6,806	$6,575
Less payments due within one year	N/A	303	3
Long-term debt		$6,503	$6,572

(1) In February 2018, PPG entered into interest rate swaps which converted $150 million of the notes from a fixed interest rate to a floating interest rate based on the three month London Interbank Offered Rate (LIBOR). The impact of the derivative on the notes represents the fair value adjustment of the debt. The average effective interest rate for the portion of the notes impacted by the swaps was 2.2% and 0.6% for the years ended December 31, 2022 and 2021, respectively. Refer to Note 11, “Financial Instruments, Hedging Activities and Fair Value Measurements” for additional information.

(2) In February 2018, PPG entered into interest rate swaps which converted $375 million of the notes from a fixed interest rate to a floating interest rate based on the three month LIBOR. The impact of the derivative on the notes represents the fair value adjustment of the debt. The average effective interest rate for the portion of the notes impacted by the swaps was 2.6% and 1.0% for the years ended December 31, 2022 and 2021, respectively. Refer to Note 11, “Financial Instruments, Hedging Activities and Fair Value Measurements” for additional information.

(3) Weighted average interest rate of 4.4% and 3.1% as of December 31, 2022 and 2021, respectively.

(4) Fair value adjustment of the 3.2% $300 million notes and 3.75% $800 million notes as a result of fair value hedge accounting treatment related to the outstanding interest rate swaps as of December 31, 2022 and 2021, respectively. Refer to Note 11, “Financial Instruments, Hedging Activities and Fair Value Measurements” for additional information.

Long-term Debt Activities

In May 2022, PPG completed a public offering of €300 million 1.875% Notes due 2025 and €700 million 2.750% Notes due 2029. These notes were issued pursuant to PPG’s existing shelf registration statement and pursuant to an indenture between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee, as supplemented (the "2022 Indenture"). The 2022 Indenture governing these notes contains covenants that limit the Company’s ability to, among other things, incur certain liens securing indebtedness, engage in certain sale-leaseback transactions, and enter into certain consolidations, mergers, conveyances, transfers or leases of all or substantially all the Company’s assets. The terms of these notes also require the Company to make an offer to repurchase Notes upon a Change of Control Triggering Event (as defined in the 2022 Indenture) at a price equal to 101% of their principal amount plus accrued and unpaid interest. The Company may issue additional debt from time to time pursuant to the Indenture. The aggregate cash proceeds from the notes, net of discounts and fees, was $1,061 million. The notes are denominated in euro and have been designated as hedges of net investments in the Company’s European operations. For more information, refer to Note 11 “Financial Instruments, Hedging Activities and Fair Value Measurements.”

In March 2022, PPG privately placed a 15-year €50 million 1.95% fixed interest note. This note contains covenants materially consistent with the 1.200% notes discussed below. This debt arrangement is denominated in euros and has been designated as a net investment hedge of the Company's European operations. Refer to Note 11 "Financial Instruments, Hedging Activities and Fair Value Measurements" for additional information.

In December 2021, PPG completed an early redemption of the 0.875% notes due March 2022 using cash on hand.

In the second quarter of 2021, two of PPG's long-term debt obligations matured; $134 million 9% non-callable debentures and non-U.S. debt of €30 million. The Company paid $170 million to settle these obligations using cash on hand.

In March 2021, PPG completed a public offering of $700 million aggregate principal amount of 1.200% notes due 2026. These notes were issued pursuant to PPG’s existing shelf registration statement and pursuant to the Indenture between the Company and the Bank of New York Mellon Trust Company, N.A., as trustee, as supplemented (the "2021 Indenture"). The 2021 Indenture governing these notes contains covenants that limit the Company’s ability to, among other things, incur certain liens securing indebtedness, engage in certain sale-leaseback transactions, and enter into certain consolidations, mergers, conveyances, transfers or leases of all or substantially all the Company’s assets. The terms of these notes also require the Company to make an offer to repurchase the notes upon a Change of Control Triggering Event (as defined in the 2021 Indenture) at a price equal to 101% of their principal amount plus accrued and unpaid interest. The Company may issue additional debt from time to time pursuant to the 2021 Indenture. The aggregate cash proceeds from the notes, net of discounts and fees, was $692 million.

In February 2021, PPG entered into a $2.0 billion Term Loan Credit Agreement (the "Term Loan Credit Agreement"). The Term Loan Credit Agreement provided the Company with the ability to borrow up to an aggregate principal amount of $2.0 billion on an unsecured basis prior to December 31, 2021, to be used for working capital and general corporate purposes. The Term Loan Credit Agreement contains covenants that are usual and customary restrictive covenants for facilities of its type, which include, with specified exceptions, limitations on the Company’s ability to create liens or other encumbrances, to enter into sale and leaseback transactions and to enter into consolidations, mergers or transfers of all or substantially all of its assets. The Term Loan Credit Agreement matures and all outstanding borrowings are due and payable on the third anniversary of the date of the initial borrowing under the Agreement. In June 2021, PPG borrowed $700 million under Term Loan Credit Agreement to finance the Company’s acquisition of Tikkurila, and to pay fees, costs and expenses related thereto. In December 2021, PPG borrowed an additional $700 million under the Term Loan Credit Agreement. In 2022, PPG repaid $300 million of the Term Loan Credit Agreement using cash on hand. Borrowings of $1.1 billion and $1.4 billion were outstanding under the Term Loan Credit Agreement as of December 31, 2022 and December 31, 2021, respectively.

In August 2020, PPG completed a public offering of $100 million aggregate principal amount of 3.75% notes due March 2028. These notes were issued as additional notes pursuant to PPG’s existing shelf registration statement and pursuant to the Indenture between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee, as supplemented (the "2018 Indenture"), which is the same Indenture pursuant to which we previously issued $700 million in aggregate principle amount of our 3.75% notes due March 2028 on February 27, 2018. The new notes will be treated as a single series of notes with the existing notes under the 2018 Indenture, have the same CUSIP number as the existing notes, and be fungible with the existing notes for US federal income tax purposes. The Indenture governing these notes contains covenants that limit the Company’s ability to, among other things, incur certain liens securing indebtedness, engage in certain sale-leaseback transactions, and enter into certain consolidations, mergers, conveyances, transfers or leases of all or substantially all the Company’s assets. The terms of these notes also require the Company to make an offer to repurchase the notes upon a Change of Control Triggering Event (as defined in the 2018 Indenture) at a price equal to 101% of their principal amount plus accrued and unpaid interest. The Company may issue additional debt from time to time pursuant to the 2018 Indenture. The aggregate cash proceeds from the notes, including the premium received at issuance, net of fees, was $119 million.

In June 2020, PPG completed an early redemption of the $500 million 3.6% notes due November 2020 using proceeds from the May 2020 public offering and cash on hand. The Company recorded a charge of $7 million in the second quarter for the debt redemption which consists of the aggregate make-whole cash premium of $6 million and a balance of unamortized fees and discounts of $1 million related to the debt redeemed.

In May 2020, PPG completed a public offering of $300 million aggregate principal amount of 2.55% notes due 2030. These notes were issued pursuant to PPG's existing shelf registration statement and pursuant to an indenture between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee, as supplemented (the "2020 Indenture"). The 2020 Indenture governing these notes contains covenants that limit the Company's ability to, among other things, incur certain liens securing indebtedness, engage in certain sale-leaseback transactions, and enter into certain consolidations, mergers, conveyances, transfers or leases of all or substantially all the Company's assets. The terms of these notes also require the Company to make an offer to repurchase the notes upon a Change of Control Triggering Event (as defined in the 2020 Indenture) at a price equal to 101% of their principal amount plus accrued and unpaid interest. The Company may issue additional debt from time to time pursuant to the 2020 Indenture. The aggregate cash proceeds from the notes, net of discounts and fees, was $296 million.

In April 2020, PPG entered into a $1.5 billion 364-Day Term Loan Credit Agreement (the "Term Loan"). The Term Loan contained covenants that are consistent with those in the Credit Agreement discussed below and that are usual and customary restrictive covenants for facilities of its type, which include, with specified exceptions, limitations on the Company's ability to create liens or other encumbrances, to enter into sale and leaseback transactions and to enter into consolidations, mergers or transfers of all or substantially all of its assets. In 2020, PPG repaid $1.1 billion of the Term Loan using cash on hand. In the first quarter 2021, PPG repaid the remaining $400 million of the Term Loan using cash on hand. The Term Loan terminated on April 13, 2021.

Credit agreements

In August 2019, PPG amended and restated its five-year credit agreement (the "Credit Agreement") with several banks and financial institutions. The Credit Agreement provides for a $2.2 billion unsecured revolving credit facility. The Company has the ability to increase the size of the Credit Agreement by up to an additional $750 million, subject to the receipt of lender commitments and other conditions precedent. The Credit Agreement will terminate on August 30, 2024. The Company has the right, subject to certain conditions set forth in the Credit Agreement, to designate certain subsidiaries of the Company as borrowers under the Credit Agreement. In connection with any such designation, the Company is required to guarantee the obligations of any such subsidiaries under the Credit Agreement. In March 2020, PPG borrowed $800 million under the Credit Agreement and repaid that amount in full in April 2020. For the years ended December 31, 2022 and 2021, there were no amounts outstanding under the credit agreement. The indicative borrowing rate on a one month, U.S. dollar denominated borrowing was 4.4% at December 31, 2022.

Borrowings under the Credit Agreement may be made in U.S. Dollars or in euros. The Credit Agreement provides that loans will bear interest at rates based, at the Company's option, on one of two specified base rates plus a margin based on certain formulas defined in the Credit Agreement. Additionally, the Credit Agreement contains a Commitment Fee, as defined in the Credit Agreement, on the amount of unused commitments under the Credit Agreement ranging from 0.060% to 0.125% per annum.

The Credit Agreement also supports the Company's commercial paper borrowings which are classified as long-term based on PPG's intent and ability to refinance these borrowings on a long-term basis. There were no commercial paper borrowings outstanding as of December 31, 2022. There were $440 million commercial paper borrowings outstanding as of December 31, 2021.

The Credit Agreement contains usual and customary restrictive covenants for facilities of its type, which include, with specified exceptions, limitations on the Company's ability to create liens or other encumbrances, to enter into sale and leaseback transactions and to enter into consolidations, mergers or transfers of all or substantially all of its assets. The Credit Agreement also requires the Company to maintain a ratio of Total Indebtedness to Total Capitalization, as defined in the Credit Agreement, of 60% or less; provided, that for any fiscal quarter in which the Company has made an acquisition for consideration in excess of $1 billion and for the next five fiscal quarters thereafter, the ratio of Total Indebtedness to Total Capitalization may not exceed 65% at any time. As of December 31, 2022, Total Indebtedness to Total Capitalization as defined under the Credit Agreement was 49%.

The Credit Agreement contains, among other things, customary events of default that would permit the lenders to accelerate the loans, including the failure to make timely payments when due under the Credit Agreement or other material indebtedness, the failure to satisfy covenants contained in the Credit Agreement, a change in control of the Company and specified events of bankruptcy and insolvency.

Restrictive Covenants and Cross-Default Provisions

As of December 31, 2022, PPG was in full compliance with the restrictive covenants under its various credit agreements, loan agreements and indentures.

Additionally, the Company's Credit Agreement contains customary cross-default provisions. These provisions provide that a default on a debt service payment of $50 million or more for longer than the grace period provided under another agreement may result in an event of default under this agreement. None of the Company's primary debt obligations are secured or guaranteed by the Company's affiliates.

Long-term Debt Maturities

($ in millions)	***Maturity per year***
2023	$303
2024	$1,396
2025	$959
2026	$698
2027	$642
Thereafter	$2,808

Short-term Debt Obligations

($ in millions)	***2022***	***2021***
Various, weighted average 2.7% and 0.7% as of December 31, 2022 and 2021, respectively.	$10	$6

Lines of Credit, Letters of Credit and Surety Bonds

PPG's non-U.S. operations have uncommitted lines of credit totaling $539 million of which $4 million was used as of December 31, 2022. These uncommitted lines of credit are subject to cancellation at any time and are generally not subject to any commitment fees.

The Company had outstanding letters of credit and surety bonds of $231 million and $173 million as of December 31, 2022 and 2021, respectively. The letters of credit secure the Company's performance to third parties under certain self-insurance programs and other commitments made in the ordinary course of business. The Company does not believe any loss related to these letters of credit or surety bonds is likely.

11. Financial Instruments, Hedging Activities and Fair Value Measurements

Financial instruments include cash and cash equivalents, short-term investments, cash held in escrow, marketable equity securities, accounts receivable, company-owned life insurance, accounts payable, short-term and long-term debt instruments, and derivatives. The fair values of these financial instruments approximated their carrying values at December 31, 2022 and 2021, in the aggregate, except for long-term debt instruments.

Hedging Activities

The Company has exposure to market risk from changes in foreign currency exchange rates and interest rates. As a result, financial instruments, including derivatives, have been used to hedge a portion of these underlying economic exposures. Certain of these instruments qualify as fair value, cash flow, and net investment hedges upon meeting the requisite criteria, including effectiveness of offsetting hedged or underlying exposures. Changes in the fair value of derivatives that do not qualify for hedge accounting are recognized in Income before income taxes in the period incurred.

PPG's policies do not permit speculative use of derivative financial instruments. PPG enters into derivative financial instruments with high credit quality counterparties and diversifies its positions among such counterparties in order to reduce its exposure to credit losses. The Company did not realize a credit loss on derivatives during the three-year period ended December 31, 2022.

All of PPG's outstanding derivative instruments are subject to accelerated settlement in the event of PPG's failure to meet its debt or payment obligations under the terms of the instruments' contractual provisions. In addition, if the Company would be acquired and its payment obligations under its derivative instruments' contractual arrangements are not assumed by the acquirer, or if PPG would enter into bankruptcy, receivership or reorganization proceedings, its outstanding derivative instruments would also be subject to accelerated settlement.

In 2022 and 2021, there were no derivative instruments de-designated or discontinued as a hedging instrument. There were no gains or losses deferred in Accumulated other comprehensive loss on the consolidated balance sheet that were reclassified to Income before income taxes in the consolidated statement of income during the three-year period ended December 31, 2022 related to hedges of anticipated transactions that were no longer expected to occur.

Fair Value Hedges

The Company uses interest rate swaps from time to time to manage its exposure to changing interest rates. When outstanding, the interest rate swaps are typically designated as fair value hedges of certain outstanding debt obligations of the Company and are recorded at fair value.

In February 2018, PPG entered into interest rate swaps which converted $525 million of fixed rate debt to variable rate debt. The swaps are designated as fair value hedges and are carried at fair value. Changes in the fair value of these swaps and changes in the fair value of the related debt are recorded in Interest expense in the accompanying consolidated statement of income. The fair value of these interest rate swaps was a liability of $20 million and an asset of $36 million at December 31, 2022 and 2021, respectively.

Cash Flow Hedges

At times, PPG designates certain foreign currency forward contracts as cash flow hedges of the Company's exposure to variability in exchange rates on third party transactions denominated in foreign currencies. There were no outstanding cash flow hedges at December 31, 2022 and December 31, 2021, respectively.

Net Investment Hedges

PPG uses cross currency swaps and foreign currency euro-denominated debt to hedge a significant portion of its net investment in its European operations, as follows:

As of December 31, 2022 and December 31, 2021, PPG had U.S. dollar to euro cross currency swap contracts with total notional amounts of $775 million and designated these contracts as hedges of the Company's net investment in its European operations. During the term of these contracts, PPG will receive payment in U.S. dollars and make payments in euros to the counterparties. As of December 31, 2022 and 2021, the fair value of these contracts were net assets of $88 million and $50 million, respectively.

At December 31, 2022 and 2021, PPG had designated €2.5 billion and €1.4 billion, respectively, of euro-denominated borrowings as hedges of a portion of its net investment in the Company's European operations. The carrying value of these instruments at December 31, 2022 and 2021 was $2.6 billion and $1.6 billion, respectively.

There were no foreign currency forward contracts designated as net investment hedges used or outstanding as of and for the periods ended December 31, 2022, 2021 and 2020.

Other Financial Instruments

PPG uses foreign currency forward contracts to manage net transaction exposures that do not qualify for hedge accounting; therefore, the change in the fair value of these instruments is recorded in Other (income)/charges, net in the consolidated statement of income in the period of change. Underlying notional amounts related to these foreign currency forward contracts were $1.8 billion and $1.9 billion at December 31, 2022 and 2021, respectively. The fair values of these contracts was a net asset of $24 million as of both December 31, 2022 and 2021.

Gains/Losses Deferred in Accumulated Other Comprehensive Loss

As of December 31, 2022 and 2021, the Company had accumulated pretax unrealized translation gains in Accumulated other comprehensive loss on the consolidated balance sheet related to the euro-denominated borrowings, foreign currency forward contracts, and the cross currency swaps of $327 million and $204 million, respectively.

The following table summarizes the amount of gains/(losses) deferred in Other comprehensive (loss)/income ("OCI") and the amount and location of gains recognized within the consolidated statement of income related to derivative and debt financial instruments for the years ended December 31, 2022, 2021 and 2020. All dollar amounts are shown on a pretax basis.

	2022		2021		2020		
($ in millions)	Gain Deferred in OCI	Gain Recognized	Gain Deferred in OCI	Gain Recognized	Loss Deferred in OCI	Gain Recognized	Caption in Consolidated Statement of Income
Fair Value							
Interest rate swaps		$8		$15		$12	Interest expense
Total Fair Value		$8		$15		$12	
Net Investment							
Cross currency swaps	$38	$16	$53	$13	($57)	$16	Interest expense
Foreign denominated debt	85	—	173	—	(200)	—	
Total Net Investment	$123	$16	$226	$13	($257)	$16	
Economic							
Foreign currency forward contracts		$43		$23		$30	Other (income)/charges, net

Fair Value Measurements

The Company follows a fair value measurement hierarchy to measure its assets and liabilities. As of December 31, 2022 and 2021, respectively, the assets and liabilities measured at fair value on a recurring basis were cash equivalents, equity securities and derivatives. In addition, the Company measures its pension plan assets at fair value (see Note 14, "Employee Benefit Plans" for further details). The Company's financial assets and liabilities are measured using inputs from the following three levels:

Level 1 inputs are quoted prices in active markets for identical assets and liabilities that the Company has the ability to access at the measurement date. Level 1 inputs are considered to be the most reliable evidence of fair value as they are based on unadjusted quoted market prices from various financial information service providers and securities exchanges.

Level 2 inputs are directly or indirectly observable prices that are not quoted on active exchanges, which include quoted prices for similar assets and liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, inputs other than quoted prices that are observable for the asset or liability and inputs that are derived principally from or corroborated by observable market data by correlation or other means. The fair values of the derivative instruments reflect the instruments' contractual terms, including the period to maturity, and uses observable market-based inputs, including forward curves.

Level 3 inputs are unobservable inputs employed for measuring the fair value of assets or liabilities. The Company does not have any recurring financial assets or liabilities that are recorded in its consolidated balance sheets as of December 31, 2022 and 2021 that are classified as Level 3 inputs.

Assets and liabilities reported at fair value on a recurring basis

	December 31, 2022			December 31, 2021		
($ in millions)	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Assets:						
Other current assets:						
Marketable equity securities	$9	$—	$—	$6	$—	$—
Foreign currency forward contracts[a]	—	27	—	—	28	—
Cross currency swaps[b]	—	39	—	—	—	—
Investments:						
Marketable equity securities	$61	$—	$—	$98	$—	$—
Other assets:						
Cross currency swaps[b]	$—	$49	$—	$—	$50	$—
Interest rate swaps[c]	—	—	—	—	36	—
Liabilities:						
Accounts payable and accrued liabilities:						
Foreign currency forward contracts[a]	$—	$3	$—	$—	$4	$—
Interest rate swaps[c]	—	1	—	—	—	—
Other liabilities:						
Interest rate swaps[c]	$—	$19	$—	$—	$—	$—

(a) Derivatives not designated as hedging instruments

(b) Net investment hedges

(c) Fair value hedges

Long-Term Debt

($ in millions)	December 31, 2022 [a]	December 31, 2021 [b]
Long-term debt - carrying value	$6,796	$6,565
Long-term debt - fair value	$6,375	$6,958

(a) Excluding finance lease obligations of $10 million and short term borrowings of $10 million as of December 31, 2022.

(b) Excluding finance lease obligations of $10 million and short term borrowings of $6 million as of December 31, 2021.

The fair values of the debt instruments were measured using Level 2 inputs, including discounted cash flows and interest rates then currently available to the Company for instruments of the same remaining maturities.

12. Earnings Per Common Share

($ in millions, except per share amounts)	2022	2021	2020
Earnings per common share (attributable to PPG)			
Income from continuing operations, net of tax	$1,028	$1,420	$1,056
(Loss)/income from discontinued operations, net of tax	(2)	19	3
Net income (attributable to PPG)	$1,026	$1,439	$1,059
Weighted average common shares outstanding	236.1	237.6	236.8
Effect of dilutive securities:			
Stock options	0.5	1.0	0.4
Other stock compensation plans	0.7	0.8	0.7
Potentially dilutive common shares	1.2	1.8	1.1
Adjusted weighted average common shares outstanding	237.3	239.4	237.9
Earnings per common share (attributable to PPG)			
Income from continuing operations, net of tax	$4.35	$5.98	$4.46
(Loss)/income from discontinued operations, net of tax	(0.01)	0.08	0.01
Net income (attributable to PPG)	$4.34	$6.06	$4.47
Earnings per common share - assuming dilution (attributable to PPG)			
Income from continuing operations, net of tax	$4.33	$5.93	$4.44
(Loss)/income from discontinued operations, net of tax	(0.01)	0.08	0.01
Net income (attributable to PPG)	$4.32	$6.01	$4.45

Excluded from the computation of earnings per diluted share due to their antidilutive effect were 0.9 million, zero, and 1.4 million outstanding stock options in 2022, 2021 and 2020, respectively.

13. Income Taxes

The provision for income taxes by taxing jurisdiction and by significant components consisted of the following:

($ in millions)	2022	2021	2020
Current			
U.S. federal	$137	$25	$12
U.S. state and local	20	13	6
Foreign	325	301	320
Total current income tax expense	$482	$339	$338
Deferred			
U.S. federal	($79)	$12	$1
U.S. state and local	(7)	3	(3)
Foreign	(71)	20	(45)
Total deferred income tax (benefit)/expense	($157)	$35	($47)
Total income tax expense	$325	$374	$291

A reconciliation of the statutory U.S. corporate federal income tax rate to the Company's effective tax rate follows:

	2022	2021	2020
U.S. federal income tax rate	21.0 %	21.0 %	21.0 %
Changes in rate due to:			
Taxes on non-U.S. earnings	3.6	2.7	3.3
U.S. state and local taxes	0.7	0.8	0.3
U.S. tax (benefit)/cost on foreign operations	(0.4)	(1.6)	0.1
Tax benefits from equity awards	(0.3)	(0.3)	(0.4)
Change in valuation allowance reserves	0.6	—	(1.4)
U.S. tax incentives	(1.0)	(0.6)	(0.9)
Uncertain tax positions	(0.4)	(1.4)	0.9
Other	(0.3)	—	(1.5)
Effective income tax rate	**23.5 %**	**20.6 %**	**21.4 %**

The effective tax rate for the year-ended December 31, 2022 was 23.5%, an increase of 2.9% from the prior year primarily driven by charges associated with PPG's operations in Russia along with a reduction in the release of reserves for uncertain tax positions compared to the prior year.

Income before income taxes of the Company's U.S. operations for 2022, 2021 and 2020 was $288 million, $469 million and $190 million, respectively. Income before income taxes of the Company's foreign operations for 2022, 2021 and 2020 was $1,093 million, $1,346 million and $1,172 million, respectively.

Deferred income taxes

Deferred income taxes are provided for the effect of temporary differences that arise because there are certain items treated differently for financial accounting than for income tax reporting purposes. The deferred tax assets and liabilities are determined by applying the enacted tax rate in the year in which the temporary difference is expected to reverse.

($ in millions)	2022	2021
Deferred income tax assets related to		
Employee benefits	$275	$386
Contingent and accrued liabilities	67	74
Operating loss and other carry-forwards	218	278
Operating lease liabilities	203	215
Research and development amortization	149	68
Other	168	121
Valuation allowance	(182)	(172)
Total	$898	$970
Deferred income tax liabilities related to		
Property	$223	$278
Intangibles	720	814
Employee benefits	81	75
Operating lease right-of-use assets	206	216
Other	74	36
Total	$1,304	$1,419
Deferred income tax liabilities – net	($406)	($449)

Net operating loss and credit carryforwards

($ in millions)	2022	2021	Expiration
Available net operating loss carryforwards, tax effected:			
Indefinite expiration	$84	$106	NA
Definite expiration	66	77	2023-2042
Total	$150	$183	
Income tax credit carryforwards	$89	$115	2023-2042

A valuation allowance of $182 million and $172 million has been established for carry-forwards and certain other items at December 31, 2022 and 2021, respectively, when the ability to utilize them is not likely.

Undistributed foreign earnings

The Company had $4.6 billion of undistributed earnings of non-U.S. subsidiaries as of December 31, 2022. This amount relates to approximately 280 subsidiaries in approximately 80 taxable jurisdictions. The Company estimates repatriation of undistributed earnings of non-U.S. subsidiaries as of December 31, 2022 would result in a tax cost of $101 million.

As of December 31, 2022, the Company had not changed its intention to reinvest foreign earnings indefinitely or repatriate when it is tax effective to do so, and as such, has not established a liability for foreign withholding taxes or other costs that would be incurred if the earnings were repatriated.

Unrecognized tax benefits

The Company files federal, state and local income tax returns in numerous domestic and foreign jurisdictions. In most tax jurisdictions, returns are subject to examination by the relevant tax authorities for a number of years after the returns have been filed. The Company is no longer subject to examinations by tax authorities in any major tax jurisdiction for years before 2008. Additionally, the Company is no longer subject to examination by the Internal Revenue Service for U.S. federal income tax returns filed for years through 2016. The examinations of the Company’s U.S. federal income tax returns for 2017 and 2018 are currently underway.

A reconciliation of the total amounts of unrecognized tax benefits (excluding interest and penalties) as of December 31 follows:

($ in millions)	***2022***	***2021***	***2020***
January 1	$158	$175	$167
Current year tax positions - additions	19	12	25
Prior year tax positions - additions	2	10	5
Prior year tax positions - reductions	(2)	(2)	(2)
Statute of limitations expirations	(23)	(19)	(8)
Settlements	(3)	(21)	(11)
Foreign currency translation	(6)	3	(1)
December 31	$145	$158	$175

The Company expects that any reasonably possible change in the amount of unrecognized tax benefits in the next 12 months would not be significant. The total amount of unrecognized tax benefits that, if recognized, would affect the effective tax rate was $120 million as of December 31, 2022.

Interest and penalties

($ in millions)	***2022***	***2021***	***2020***
Accrued interest and penalties related to unrecognized tax benefits	$17	$17	$18
Loss/(income) recognized in income tax expense related to interest and penalties	$1	($2)	$2

The Company recognizes accrued interest and penalties related to unrecognized tax benefits in income tax expense.

14. Employee Benefit Plans

Defined Benefit Plans

PPG has defined benefit pension plans that cover certain employees worldwide. The principal defined benefit pension plans are those in the U.S., Canada, Germany, the Netherlands and the U.K. These plans in the aggregate represent approximately 95% of PPG's total projected benefit obligation at December 31, 2022, of which the U.S. defined benefit pension plans represent the largest component.

As of January 1, 2006, the Company's U.S. salaried defined benefit plans were closed to new entrants. In 2011 and 2012, the Company approved amendments related to its U.S. and Canadian defined benefit plans pursuant to which employees stopped accruing benefits at certain dates based on the affected employee's combined age and years of service to PPG. As of December 31, 2020, the Company's U.S. and Canadian defined benefit plans were frozen for all participants. The Company plans to continue reviewing and potentially amending PPG defined benefit plans in the future.

Canadian pension annuity contracts

In December 2021, the Company purchased group annuity contracts that transferred pension benefit obligations for certain of the Company's retirees in Canada who were receiving their monthly retirement benefit payments from PPG's Canadian pension plans to a third-party insurance company. The amount of each affected retiree's annuity payment is equal to the amount of such individual's pension benefit. The purchase of group annuity contracts was funded directly by the assets of the Canadian plans. By transferring the obligations and assets to the insurance company, the Company reduced its overall pension projected benefit obligation by approximately $175 million and recognized a non-cash pension settlement charge of $50 million in the consolidated statement of income for the year ended December 31, 2021.

Postretirement medical

PPG sponsors welfare benefit plans that provide postretirement medical and life insurance benefits for certain U.S. and Canadian employees and their dependents of which the U.S. welfare benefit plans represent approximately 87% of PPG's total projected benefit obligation at December 31, 2022. Salaried and certain hourly employees in the U.S. hired on or after October 1, 2004, or rehired on or after October 1, 2012 are not eligible for postretirement medical benefits. These plans in the U.S. and Canada require retiree contributions based on retiree-selected coverage levels for certain retirees and their dependents and provide for sharing of future benefit cost increases between PPG and participants based on management discretion. The Company has the right to modify, amend or terminate certain of these benefit plans in the future.

Effective January 1, 2017, the Company-sponsored Medicare-eligible plans were replaced by a Medicare private exchange. The announcement of this plan design change triggered a remeasurement of PPG's retiree medical benefit obligation using prevailing interest rates. The plan design change resulted in a $306 million reduction in the Company's postretirement benefit obligation. PPG accounted for the plan design change prospectively, and the impact was amortized to periodic postretirement benefit cost over a 5.6 year period through mid-2022.

The following table sets forth the changes in projected benefit obligations ("PBO"), plan assets, the funded status and the amounts recognized on the accompanying consolidated balance sheet for the Company's defined benefit pension and other postretirement benefit plans:

	Defined Benefit Pension Plans					
	United States		International		Total PPG	
($ in millions)	2022	2021	2022	2021	2022	2021
Projected benefit obligation, January 1	$1,920	$2,042	$1,614	$1,933	$3,534	$3,975
Service cost	—	—	9	9	9	9
Interest cost	45	39	28	26	73	65
Actuarial gains	(449)	(72)	(485)	(91)	(934)	(163)
Benefits paid	(91)	(89)	(49)	(60)	(140)	(149)
Acquisitions	—	—	—	48	—	48
Foreign currency translation adjustments	—	—	(126)	(51)	(126)	(51)
Settlements and curtailments	—	—	(22)	(198)	(22)	(198)
Other	—	—	(8)	(2)	(8)	(2)
Projected benefit obligation, December 31	$1,425	$1,920	$961	$1,614	$2,386	$3,534
Market value of plan assets, January 1	$1,329	$1,335	$1,646	$1,881	$2,975	$3,216
Actual return on plan assets	(228)	66	(506)	42	(734)	108
Company contributions	—	—	11	10	11	10
Benefits paid	(73)	(72)	(41)	(51)	(114)	(123)
Acquisitions	—	—	—	3	—	3
Plan settlements	—	—	(22)	(198)	(22)	(198)
Foreign currency translation adjustments	—	—	(140)	(38)	(140)	(38)
Other	—	—	(2)	(3)	(2)	(3)
Market value of plan assets, December 31	$1,028	$1,329	$946	$1,646	$1,974	$2,975
Funded Status	($397)	($591)	($15)	$32	($412)	($559)
Amounts recognized in the Consolidated Balance Sheet:						
Other assets (long-term)	—	—	183	310	183	310
Accounts payable and accrued liabilities	(17)	(23)	(12)	(12)	(29)	(35)
Accrued pensions	(380)	(568)	(186)	(266)	(566)	(834)
Net (liability)/asset recognized	($397)	($591)	($15)	$32	($412)	($559)

	Other Postretirement Benefit Plans					
	United States		International		Total PPG	
($ in millions)	2022	2021	2022	2021	2022	2021
Projected benefit obligation, January 1	$631	$682	$93	$104	$724	$786
Service cost	8	11	—	1	8	12
Interest cost	13	12	3	2	16	14
Actuarial gains	(154)	(33)	(20)	(10)	(174)	(43)
Benefits paid	(40)	(41)	(4)	(4)	(44)	(45)
Foreign currency translation adjustments	—	—	(6)	—	(6)	—
Projected benefit obligation, December 31	$458	$631	$66	$93	$524	$724
Amounts recognized in the Consolidated Balance Sheet:						
Accounts payable and accrued liabilities	(44)	(47)	(4)	(5)	(48)	(52)
Other postretirement benefits	(414)	(584)	(62)	(88)	(476)	(672)
Net liability recognized	($458)	($631)	($66)	($93)	($524)	($724)

The PBO is the actuarial present value of benefits attributable to employee service rendered to date, including the effects of estimated future pay increases. The accumulated benefit obligation ("ABO") is the actuarial present value of benefits attributable to employee service rendered to date, but does not include the effects of estimated future pay increases. The ABO for all defined benefit pension plans as of December 31, 2022 and 2021 was $2.3 billion and $3.5 billion, respectively.

The following table details the pension plans where the benefit liability exceeds the fair value of the plan assets:

	Pensions	
($ in millions)	2022	2021
Plans with PBO in Excess of Plan Assets:		
Projected benefit obligation	$1,863	$2,232
Fair value of plan assets	$1,270	$1,366
Plans with ABO in Excess of Plan Assets:		
Accumulated benefit obligation	$1,833	$2,197
Fair value of plan assets	$1,266	$1,362

Net actuarial losses/(gains) and prior service cost/(credit) deferred in accumulated other comprehensive loss

	Pensions		Other Postretirement Benefits	
($ in millions)	2022	2021	2022	2021
Accumulated net actuarial losses/(gains)	$748	$857	($16)	$170
Accumulated prior service cost/(credit)	—	5	(10)	(21)
Total	$748	$862	($26)	$149

The accumulated net actuarial losses (gains) for pensions and other postretirement benefits relate primarily to historical changes in the discount rates. The accumulated net actuarial losses exceeded 10% of the higher of the market value of plan assets or the PBO at the beginning of each of the last three years; therefore, amortization of such excess has been included in net periodic benefit costs for pension and other postretirement benefits in these periods. The amortization period is the average remaining service period of active employees expected to receive benefits unless a plan is mostly inactive in which case the amortization period is the average remaining life expectancy of the plan participants. Accumulated prior service cost (credit) is amortized over the future service periods of those employees who are active at the dates of the plan amendments and who are expected to receive benefits.

The net decrease in Accumulated other comprehensive loss (pretax) in 2022 relating to defined benefit pension and other postretirement benefits is primarily attributable to pension and other postretirement plan discount rate increases, as follows:

($ in millions)	Pensions	Other Postretirement Benefits
Net actuarial gain arising during the year	($60)	($174)
New prior service cost	(5)	—
Amortization of actuarial loss	(34)	(12)
Amortization of prior service credit	—	11
Foreign currency translation adjustments	(9)	—
Impact of settlements	(6)	—
Net decrease	($114)	($175)

The 2022 net actuarial gain related to the Company's pension and other postretirement benefit plans was primarily due to an increase in the weighted average discount rate used to determine the benefit obligation at December 31, 2022.

Net periodic benefit (income)/cost

	Pensions			Other Postretirement Benefits		
($ in millions)	2022	2021	2020	2022	2021	2020
Service cost	$9	$9	$24	$8	$12	$10
Interest cost	73	65	87	16	14	20
Expected return on plan assets	(140)	(152)	(144)	—	—	—
Amortization of prior service credit	—	—	—	(11)	(54)	(59)
Amortization of actuarial losses	34	39	71	12	20	15
Settlements, curtailments, and special termination benefits	6	53	18	—	—	—
Net periodic benefit (income)/cost	($18)	$14	$56	$25	($8)	($14)

Service cost for net periodic pension and other postretirement benefit costs is included in Cost of sales, exclusive of depreciation and amortization, Selling, general and administrative, and Research and development, net in the accompanying consolidated statements of income. Except for the Canadian pension settlement charge in 2021, all other components of net periodic benefit cost are recorded in Other (income)/charges, net in the accompanying consolidated statements of income.

Key assumptions

The following weighted average assumptions were used to determine the benefit obligation for the Company's defined benefit pension and other postretirement plans as of December 31, 2022 and 2021:

	United States		International		Total PPG	
	2022	2021	2022	2021	2022	2021
Discount rate	5.4 %	2.8 %	4.9 %	2.0 %	5.2 %	2.5 %
Rate of compensation increase	2.5 %	2.5 %	3.1 %	2.8 %	2.7 %	2.6 %

The following weighted average assumptions were used to determine the net periodic benefit cost for the Company's defined benefit pension and other postretirement benefit plans for the three years in the period ended December 31, 2022:

	2022	2021	2020
Discount rate	2.5 %	2.1 %	2.8 %
Expected return on assets	5.0 %	4.8 %	5.0 %
Rate of compensation increase	2.6 %	1.5 %	2.6 %

These assumptions for each plan are reviewed on an annual basis. In determining the expected return on plan asset assumption, the Company evaluates the mix of investments that comprise each plan's assets and external forecasts of future long-term investment returns. The Company compares the expected return on plan assets assumption to actual historic returns to ensure reasonability. For 2022, the return on plan assets assumption for PPG's U.S. defined benefit pension plans was 7.4%. A change in the rate of return of 75 basis points, with other assumptions held constant, would impact 2023 net periodic pension expense by $8 million. The global expected return on plan assets assumption to be used in determining 2023 net periodic pension expense will be 6.5% (7.4% for the U.S. plans only).

The discount rates used in accounting for pension and other postretirement benefits are determined using a yield curve constructed of high-quality fixed-income securities as of the measurement date and using the plans' projected benefit payments. The Company has elected to use a full yield curve approach in the estimation of the service and interest cost components of net periodic pension benefit cost (income) for countries with significant pension plans. The full yield curve approach (also known as the split-rate or spot-rate method) allows the Company to align the applicable discount rates with the cost of additional service being earned and the interest being accrued on these obligations. A change in the discount rate of 75 basis points, with all other assumptions held constant, would impact 2023 net periodic benefit expense for our defined benefit pension and other postretirement benefit plans by $5 million and $1 million, respectively.

The weighted-average health care cost trend rate (inflation) used for 2022 was 5.4% declining to a projected 4.0% in the year 2046. For 2023, the assumed weighted-average health care cost trend rate used will be 5.8% declining to a projected 3.9% between 2023 and 2047 for medical and prescription drug costs, respectively. These assumptions are reviewed on an annual basis. In selecting rates for current and long-term health care cost assumptions, the Company takes into consideration a number of factors, including the Company's actual health care cost increases, the design of the Company's benefit programs, the demographics of the Company's active and retiree populations and external expectations of future medical cost inflation rates.

Contributions to defined benefit pension plans

($ in millions)	2022	2021	2020
Non-U.S. defined benefit pension plans	$11	$10	$17

Contributions made to PPG's non-U.S. defined benefit pension plans in 2022, 2021, and 2020 were required by local funding requirements. PPG expects to make contributions to its defined benefit pension plans in the range of $10 million to $20 million in 2023. PPG may make voluntary contributions to its defined benefit pension plans in 2023 and beyond.

Benefit payments

The estimated benefits expected to be paid under the Company's defined benefit pension and other postretirement benefit plans are:

($ in millions)	***Pensions***	***Other Postretirement Benefits***
2023	$148	$48
2024	$166	$47
2025	$153	$46
2026	$157	$43
2027	$160	$42
2028 to 2032	$825	$192

Plan assets

Each PPG sponsored defined benefit pension plan is managed in accordance with the requirements of local laws and regulations governing defined benefit pension plans for the exclusive purpose of providing pension benefits to participants and their beneficiaries. Investment committees comprised of PPG managers have fiduciary responsibility to oversee the management of pension plan assets by third party asset managers. Pension plan assets are held in trust by financial institutions and managed on a day-to-day basis by the asset managers. The asset managers receive a mandate from each investment committee that is aligned with the asset allocation targets established by each investment committee to achieve the plan's investment strategies. The performance of the asset managers is monitored and evaluated by the investment committees throughout the year.

Pension plan assets are invested to generate investment earnings over an extended time horizon to help fund the cost of benefits promised under the plans while mitigating investment risk. The asset allocation targets established for each pension plan are intended to diversify the investments among a variety of asset categories and among a variety of individual securities within each asset category to mitigate investment risk and provide each plan with sufficient liquidity to fund the payment of pension benefits to retirees.

The following summarizes the weighted average target pension plan asset allocation as of December 31, 2022 and 2021 for all PPG defined benefit plans:

Asset Category	***2022***	***2021***
Equity securities	15-45%	15-45%
Debt securities	30-65%	30-65%
Real estate	0-10%	0-10%
Other	20-40%	20-40%

The fair values of the Company's pension plan assets at December 31, 2022 and 2021, by asset category, are as follows:

	December 31, 2022				December 31, 2021			
($ in millions)	Level 1(1)	Level 2(1)	Level 3(1)	Total	Level 1(1)	Level 2(1)	Level 3(1)	Total
Asset Category								
Equity securities:								
U.S.								
Large cap	$66	$43	$—	$109	$79	$78	$—	$157
Small cap	25	—	—	25	48	—	—	48
Non-U.S.								
Developed and emerging markets(2)	99	43	—	142	130	76	—	206
Debt securities:								
Cash and cash equivalents	7	47	—	54	8	42	—	50
Corporate(3)								
U.S.(4)	—	168	80	248	—	232	100	332
Developed and emerging markets(2)	—	1	—	1	—	1	—	1
Diversified(5)	—	13	—	13	—	57	—	57
Government								
U.S.(4)	49	10	—	59	68	13	—	81
Developed and emerging markets(2)	—	6	—	6	—	10	—	10
Other(6)	—	—	235	235	—	—	367	367
Real estate, hedge funds, and other	—	275	362	637	—	562	487	1,049
Total assets in the fair value hierarchy	$246	$606	$677	$1,529	$333	$1,071	$954	$2,358
Common-collective trusts(7)	—	—	—	445	—	—	—	617
Total Investments	$246	$606	$677	$1,974	$333	$1,071	$954	$2,975

(1) These levels refer to the accounting guidance on fair value measurement described in Note 11, "Financial Instruments, Hedging Activities and Fair Value Measurements."

(2) These amounts represent holdings in investment grade debt or equity securities of issuers in both developed markets and emerging economies.

(3) This category represents investment grade debt securities from a diverse set of industry issuers.

(4) These investments are primarily long duration fixed income securities.

(5) This category represents commingled funds invested in diverse portfolios of debt securities.

(6) This category includes mortgage-backed and asset backed debt securities, municipal bonds and other debt securities including derivatives.

(7) Certain investments that are measured at net asset value per share (or its equivalent) are not required to be classified in the fair value hierarchy.

The change in the fair value of the Company's Level 3 pension assets for the years ended December 31, 2022 and 2021 was as follows:

($ in millions)	Real Estate	Other Debt Securities	Hedge Funds and Other Assets	Total
January 1, 2021	$124	$421	$371	$916
Realized gains/(losses)	3	(11)	9	1
Unrealized gains	22	—	8	30
Transfers in/(out), net	8	(14)	44	38
Foreign currency losses	—	(29)	(2)	(31)
December 31, 2021	$157	$367	$430	$954
Realized gains/(losses)	1	(99)	(1)	(99)
Unrealized gains/(losses)	6	—	(3)	3
Transfers out, net	(10)	(12)	(100)	(122)
Foreign currency losses	(5)	(21)	(33)	(59)
December 31, 2022	$149	$235	$293	$677

Real estate properties are externally appraised at least annually by reputable, independent appraisal firms. Property valuations are also reviewed on a regular basis and are adjusted if there has been a significant change in circumstances related to the property since the last valuation.

Other debt securities consist of insurance contracts, which are valued externally by insurance companies based on the present value of the expected future cash flows.

Hedge funds consist of a wide range of investments which target a relatively stable investment return. The underlying funds are valued at different frequencies, some monthly and some quarterly, based on the value of the underlying investments. Other assets consist primarily of small investments in private equity funds and senior secured debt obligations of non-investment grade borrowers.

Other Plans

Employee savings plans

PPG's Employee Savings Plans ("Savings Plans") cover substantially all employees in the U.S., Puerto Rico and Canada. The Company makes matching contributions to the Savings Plans, at management's discretion, based upon participants' savings, subject to certain limitations. For most participants, Company-matching contributions are established each year at the discretion of the Company and are applied to participant accounts up to a maximum of 6% of eligible participant compensation. The Company-matching contribution remained at 100% for 2022.

Compensation expense and cash contributions related to the Company match of participant contributions to the Savings Plans for 2022, 2021, and 2020 totaled $56 million, $52 million and $50 million, respectively. A portion of the Savings Plans qualifies under the Internal Revenue Code as an Employee Stock Ownership Plan. Accordingly, dividends received on PPG shares held in that portion of the Savings Plans totaling $11 million, $10 million, and $11 million for 2022, 2021, and 2020, respectively, are deductible for PPG's U.S. Federal tax purposes.

Defined contribution plans

Additionally, the Company has defined contribution plans for certain employees in the U.S., China, United Kingdom, Australia, Italy and other countries. The U.S. defined contribution plan is part of the Employee Savings Plan, and eligible employees receive a contribution equal to between 2% and 5% of annual compensation, based on age and years of service. For the years ended December 31, 2022, 2021 and 2020, the Company recognized expense for its defined contribution retirement plans of $92 million, $88 million and $64 million, respectively. The Company's annual cash contributions to its defined contribution retirement plans approximated the expense recognized in each year.

Deferred compensation plan

The Company has a deferred compensation plan for certain key managers which allows them to defer a portion of their compensation in a phantom PPG stock account or other phantom investment accounts. The amount deferred earns a return based on the investment options selected by the participant. The amount owed to participants is an unfunded and unsecured general obligation of the Company. Upon retirement, death, disability, termination of employment, scheduled payment or unforeseen emergency, the compensation deferred and related accumulated earnings are distributed in accordance with the participant's election in cash or in PPG stock, based on the accounts selected by the participant.

The plan provides participants with investment alternatives and the ability to transfer amounts between the phantom non-PPG stock investment accounts. To mitigate the impact on compensation expense of changes in the market value of the liability, the Company has purchased a portfolio of marketable securities that mirror the phantom non-PPG stock investment accounts selected by the participants, except the money market accounts. These investments are carried by PPG at fair market value, and the changes in market value of these securities are also included in Income before income taxes in the consolidated statement of income. Trading occurs in this portfolio to align the securities held with the participant's phantom non-PPG stock investment accounts, except the money market accounts.

The cost of the deferred compensation plan, comprised of dividend equivalents accrued on the phantom PPG stock account, investment income and the change in market value of the liability, was $23 million, $20 million and $25 million in 2022, 2021 and 2020, respectively. These amounts are included in Selling, general and administrative in the consolidated statements of income. The change in market value of the investment portfolio was income of $24 million, $18 million, and $24 million in 2022, 2021 and 2020, respectively, and is also included in Selling, general and administrative in the consolidated statements of income.

The Company's obligations under this plan, which are included in Accounts payable and accrued liabilities and Other liabilities on the consolidated balance sheet, totaled $105 million and $139 million as of December 31, 2022 and 2021, respectively, and the investments in marketable securities, which are included in Investments and Other current assets on the accompanying consolidated balance sheet, were $70 million and $104 million as of December 31, 2022 and 2021, respectively.

15. Commitments and Contingent Liabilities

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, antitrust, employment and other matters arising out of the conduct of PPG's current and past business activities. To the extent that these lawsuits and claims involve personal injury, property damage and certain other claims, 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 with respect to some claims in the future. PPG's lawsuits and claims against others include claims against insurers and other third parties with respect to actual and contingent losses related to environmental, asbestos and other matters.

The results of any current or future litigation and claims are inherently unpredictable. However, management believes that, in the aggregate, the outcome of all lawsuits and claims involving PPG 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.

Asbestos Matters

As of December 31, 2022, the Company was aware of certain asbestos-related claims pending against the Company and certain of its subsidiaries. The Company is defending these asbestos-related claims vigorously. The asbestos-related claims consist of claims against the Company alleging:

- exposure to asbestos or asbestos-containing products manufactured, sold or distributed by the Company or its subsidiaries ("Products Claims");
- personal injury caused by asbestos on premises presently or formerly owned, leased or occupied by the Company ("Premises Claims"); and
- asbestos-related claims against a subsidiary the Company acquired in 2013 ("Subsidiary Claims").

The Company monitors and reviews the activity associated with its asbestos claims and evaluates, on a periodic basis, its estimated liability for such claims and all underlying assumptions to determine whether any adjustment to the reserves for these claims is required. Additionally, as a supplement to its periodic monitoring and review, the Company conducts discussions with counsel and engages valuation consultants to analyze its claims history and estimate the amount of the Company's potential liability for asbestos-related claims.

In 2022, no adjustments to the Company's estimate of its asbestos-related liabilities were required.

In 2021, based on the results of the Company's valuation analysis, the Company reduced its estimate of potential liability for Products Claims by $146 million. The 2021 valuation analysis with respect to Products Claims was based, in part, upon a review of claims data following the expiration in May 2016 of the U.S. Bankruptcy Court's injunction staying most asbestos claims against the Company that had been in effect since April 2000; annual filings by disease and year; pending, paid and dismissed claims; indemnity cash flows; and estimates of future claim, indemnity and acceptance rates. The Company also adjusted its estimates of potential liability for Premises Claims and Subsidiary Claims in the fourth quarter of 2021.

As a result of the Company's 2021 review of its asbestos-related liabilities, income of $133 million was recorded in the consolidated statement of income to reduce the reserve to reflect the Company's current estimate of potential liability for asbestos-related bodily injury claims through December 31, 2057.

As of December 31, 2022 and 2021, the Company's asbestos-related reserves totaled $51 million and $54 million, respectively.

The Company believes that, based on presently available information, the total reserves of $51 million for asbestos-related claims will be sufficient to encompass all of the Company's current and estimable potential future asbestos liabilities. These reserves, which are included within Other liabilities on the accompanying consolidated balance sheets, involve significant management judgment and represent the Company's current best estimate of its liability for these claims.

The amount reserved for asbestos-related claims by its nature is subject to many uncertainties that may change over time, including (i) the ultimate number of claims filed; (ii) whether closed, dismissed or dormant claims are reinstituted, reinstated or revived; (iii) the amounts required to resolve both currently known and future unknown claims; (iv) the amount of insurance, if any, available to cover such claims; (v) the unpredictable aspects of the tort system, including a changing trial docket and the jurisdictions in which trials are scheduled; (vi) the outcome of any trials, including potential judgments or jury verdicts; (vii) the lack of specific information in many cases concerning exposure for which the Company is allegedly responsible, and the claimants' alleged diseases resulting from such exposure; and (viii) potential changes in applicable federal and/or state tort liability law. All of these factors may have a material effect upon future asbestos-related liability estimates. While the ultimate outcome of the Company's asbestos litigation cannot be predicted with certainty, the Company believes that any financial exposure resulting from its asbestos-related claims will not have a material adverse effect on the Company's consolidated financial position, liquidity or results of operations.

Environmental Matters

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.

As remediation at certain environmental sites progresses, PPG continues to refine its assumptions underlying the estimates of the expected future costs of its remediation programs. PPG's ongoing evaluation may result in additional charges against income to adjust the reserves for these sites. In 2022, 2021 and 2020, certain charges have been recorded based on updated estimates to increase existing reserves for these sites. Certain other charges related to environmental remediation actions are expensed as incurred.

As of December 31, 2022 and 2021, PPG had reserves for environmental contingencies associated with PPG's former chromium manufacturing plant in Jersey City, New Jersey ("New Jersey Chrome"), glass and chemical manufacturing sites, and for other environmental contingencies, including current manufacturing locations and National Priority List sites. These reserves are reported as Accounts payable and accrued liabilities and Other liabilities in the accompanying consolidated balance sheet.

Environmental Reserves

($ in millions)	*2022*	*2021*
New Jersey Chrome	$58	$89
Glass and chemical	60	83
Other	99	110
Total	$217	$282
Current Portion	*$50*	*$97*

Pretax charges against income for environmental remediation costs are included in Other (income)/charges, net in the accompanying consolidated statement of income. The pretax charges and cash outlays related to such environmental remediation in 2022, 2021 and 2020, were as follows:

($ in millions)	*2022*	*2021*	*2020*
New Jersey Chrome	$—	$25	$15
Glass and chemical	3	12	15
Other	10	7	8
Total	$13	$44	$38
Cash outlays for environmental spending	*$78*	*$56*	*$60*

In the fourth quarter 2021, PPG released an environmental reserve previously established at the time of the sale of the flat glass business under the terms of the separation agreement, resulting in recognition of $25 million of income from discontinued operations, or $19 million net of tax.

The Company continues to analyze, assess and remediate the environmental issues associated with New Jersey Chrome as further discussed below. Excluding the charges related to New Jersey Chrome, pretax charges against income for environmental remediation have ranged between approximately $5 million and $35 million per year for the past 10 years.

Management expects cash outlays for environmental remediation costs to range from $40 million to $60 million in 2023, and $20 million to $75 million annually from 2024 through 2027.

Actual future cash outlays may vary from expected future cash outlays and actual future costs may vary from accrued estimates due to the inherent uncertainties involved in estimating future environmental remediation costs, including possible technological, regulatory and enforcement developments, the results of environmental studies and other factors. Specifically, the level of expected future remediation costs and cash outlays is highly dependent upon activity related to New Jersey Chrome as discussed below.

Remediation: New Jersey Chrome

In June 2009, PPG entered into a settlement agreement with the New Jersey Department of Environmental Protection ("NJDEP") and Jersey City, New Jersey (which had asserted claims against PPG for lost tax revenue) which was in the form of a Judicial Consent Order (the "JCO"). Under the JCO, PPG accepted sole responsibility for the remediation activities at its former chromium manufacturing location in Jersey City and a number of additional surrounding sites. Remediation of the New Jersey Chrome sites requires PPG to remediate soil and groundwater contaminated by hexavalent chromium, as well as perform certain other environmental remediation activities. The most significant assumptions underlying the estimate of remediation costs for all New Jersey Chrome sites relate to the extent and concentration of chromium in the soil.

PPG regularly evaluates the assessments of costs incurred to date versus current progress and the potential cost impacts of the most recent information, including the extent of impacted soils, percentage of hazardous versus non-hazardous soils, daily soil excavation rates, and engineering, administrative and other associated costs. Based on these assessments, the reserve is adjusted accordingly. As of December 31, 2022 and 2021, PPG's reserve for remediation of all New Jersey Chrome sites was $58 million and $89 million, respectively. The major cost components of this liability are related to excavation of impacted soil, as well as groundwater remediation. These components each account for approximately 65% and 15% of the amount accrued at December 31, 2022, respectively.

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. Further 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 continue to be adjusted.

Remediation: Glass, Chemicals and Other Sites

Among other sites at which PPG is managing environmental liabilities, remedial actions are occurring at a chemical manufacturing site in Barberton, Ohio where PPG has completed a Facility Investigation and Corrective Measure Study under the United States Environmental Protection Agency's Resource Conservation and Recovery Act Corrective Action Program. PPG has also been addressing the impacts from a legacy plate glass manufacturing site in Kokomo, Indiana under the Voluntary Remediation Program of the Indiana Department of Environmental Management and a site associated with a legacy plate glass manufacturing site near Ford City, Pennsylvania under the Pennsylvania Land Recycling Program under the oversight of the Pennsylvania Department of Environmental Protection. PPG is currently performing additional investigation and remedial activities at these locations.

With respect to certain other waste sites, the financial condition of other potentially responsible parties also contributes to the uncertainty of estimating PPG's final costs. Although contributors of waste to sites involving other potentially responsible parties may face governmental agency assertions of joint and several liability, in general, final allocations of costs are made based on the relative contributions of wastes to such sites. PPG is generally not a major contributor to such sites.

Remediation: Reasonably Possible Matters

In addition to the amounts currently reserved for environmental remediation, the Company may be subject to loss contingencies related to environmental matters estimated to be as much as $100 million to $200 million. Such unreserved losses are reasonably possible but are not currently considered to be probable of occurrence. These reasonably possible unreserved losses relate to environmental matters at a number of sites, none of which are individually significant. The loss contingencies related to these sites include significant unresolved issues such as the nature and extent of contamination at these sites and the methods that may have to be employed to remediate them.

The impact of evolving programs, such as natural resource damage claims, industrial site re-use initiatives and domestic and international remediation programs, also adds to the present uncertainties with regard to the ultimate resolution of this unreserved exposure to future loss. The Company's assessment of the potential impact of these environmental contingencies is subject to considerable uncertainty due to the complex, ongoing and evolving process of investigation and remediation, if necessary, of such environmental contingencies, and the potential for technological and regulatory developments.

16. Shareholders' Equity

A class of 10 million shares of preferred stock, without par value, is authorized but unissued. Common stock has a par value of $1.66 $^{2}/_{3}$ per share; 1.2 billion shares are authorized.

	Common Stock	*Treasury Stock*	*Shares Outstanding*
January 1, 2020	581,146,136	(345,465,666)	235,680,470
Issuances	—	1,005,795	1,005,795
December 31, 2020	581,146,136	(344,459,871)	236,686,265
Purchases	—	(1,521,765)	(1,521,765)
Issuances	—	742,526	742,526
December 31, 2021	581,146,136	(345,239,110)	235,907,026
Purchases	—	(1,269,830)	(1,269,830)
Issuances	—	436,730	436,730
December 31, 2022	581,146,136	(346,072,210)	235,073,926

Per share cash dividends paid were $2.42, $2.26 and $2.10 in 2022, 2021 and 2020, respectively.

17. Accumulated Other Comprehensive Loss (AOCL)

($ in millions)	Foreign Currency Translation Adjustments[1]	Pension and Other Postretirement Benefit Adjustments, net of tax[2]	Unrealized Gain on Derivatives, net of tax	Accumulated Other Comprehensive Loss
January 1, 2020	($1,627)	($724)	$1	($2,350)
Current year deferrals to AOCL	(36)	(237)	—	(273)
Reclassifications from AOCL to net income	—	24	—	24
December 31, 2020	($1,663)	($937)	$1	($2,599)
Current year deferrals to AOCL	(325)	132	—	(193)
Reclassifications from AOCL to net income	—	42	—	42
December 31, 2021	($1,988)	($763)	$1	($2,750)
Current year deferrals to AOCL	(301)	175	—	(126)
Reclassifications from AOCL to net income	35	31	—	66
December 31, 2022	($2,254)	($557)	$1	($2,810)

(1) The tax cost/(benefit) related to unrealized foreign currency translation adjustments on net investment hedges as of December 31, 2022, 2021 and 2020 was $73 million, $55 million and $(6) million, respectively.

(2) The tax cost/(benefit) related to the adjustment for pension and other postretirement benefits as of December 31, 2022, 2021 and 2020 was $83 million, $48 million and $(70) million, respectively. Reclassifications from AOCL are included in the computation of net periodic benefit costs (see Note 14, "Employee Benefit Plans").

18. Other (Income)/Charges, Net

($ in millions)	2022	2021	2020
Gain on sale of assets[1]	($10)	($47)	($5)
Royalty income	(8)	(8)	(7)
Share of net earnings of equity affiliates (See Note 5)	(25)	(15)	(8)
Income from legal settlements	—	(22)	—
Other, net	(17)	(51)	56
Total (income)/charges, net	($60)	($143)	$36

(1) In 2021, PPG recognized a $34 million gain on the sale of a production facility in connection with the Company's manufacturing footprint consolidation plans and associated restructuring programs.

19. Stock-Based Compensation

The Company's stock-based compensation includes stock options, restricted stock units ("RSUs") and grants of contingent shares that are earned based on achieving targeted levels of total shareholder return. All current grants of stock options, RSUs and contingent shares are made under the PPG Industries, Inc. Amended and Restated Omnibus Incentive Plan ("PPG Amended Omnibus Plan"), which was amended and restated effective April 21, 2016.

($ in millions)	2022	2021	2020
Total stock-based compensation	$35	$57	$44
Income tax benefit recognized	$8	$12	$10

Stock Options

PPG has outstanding stock option awards that have been granted under the PPG Amended Omnibus Plan. Under the PPG Amended Omnibus Plan, certain employees of the Company have been granted options to purchase shares of common stock at prices equal to the fair market value of the shares on the date the options were granted. The options are generally exercisable 36 months after being granted and have a maximum term of 10 years. Upon exercise of a stock option, shares of Company stock are issued from treasury stock.

The fair value of stock options issued to employees is measured on the date of grant and is recognized as expense, net of estimated forfeitures, over the requisite service period. PPG estimates the fair value of stock options using the Black-Scholes option pricing model. The risk-free interest rate is determined by using the U.S. Treasury yield curve at the date of the grant and using a maturity equal to the expected life of the option. The expected life of options is calculated using the average of the vesting term and the maximum term, as prescribed by accounting guidance on the use of the simplified method for determining the expected term of an employee share option. The expected dividend yield and volatility are based on historical stock prices and dividend amounts over past time periods equal in length to the expected life of the options. PPG applies an estimated forfeiture rate that is calculated based on historical activity.

The following weighted average assumptions were used to calculate the fair values of stock option grants in each year:

	2022	2021	2020
Weighted average exercise price	$151.87	$136.60	$119.52
Risk-free interest rate	2.0 %	1.0 %	1.6 %
Expected life of option in years	6.5	6.5	6.5
Expected dividend yield	1.6 %	1.6 %	1.5 %
Expected volatility	25.7 %	25.3 %	20.0 %

The weighted average fair value of options granted was $36.52 per share, $29.27 per share and $21.93 per share for the years ended December 31, 2022, 2021, and 2020, respectively.

Stock Options Outstanding and Exercisable	*Number of Shares*	*Weighted Average Exercise Price*	*Weighted Average Remaining Contractual Life (in years)*	*Intrinsic Value (in millions)*
Outstanding, January 1, 2022	3,340,402	$110.98	6.1	
Granted	487,277	$151.87		
Exercised	(158,837)	$77.24		
Forfeited/Expired	(151,391)	$134.34		
Outstanding, December 31, 2022	3,517,451	$117.16	5.7	$47
Vested or expected to vest, December 31, 2022	3,444,650	$116.57	5.6	$47
Exercisable, December 31, 2022	2,039,716	$104.58	4.0	$43

At December 31, 2022, unrecognized compensation cost related to outstanding stock options that have not yet vested totaled $7 million. This cost is expected to be recognized as expense over a weighted average period of 1.4 years.

The following table presents stock option activity for the years ended December 31, 2022, 2021 and 2020:

($ in millions)	2022	2021	2020
Total intrinsic value of stock options exercised	$12	$32	$31
Cash received from stock option exercises	$12	$47	$54
Income tax benefit from the exercise of stock options	$3	$8	$7
Total fair value of stock options vested	$16	$11	$11

Restricted Stock Units (“RSUs”)

Long-term incentive value is delivered to selected key management employees by granting RSUs, which have either time or performance-based vesting features. The fair value of an RSU is equal to the market value of a share of PPG common stock on the date of grant. Time-based RSUs generally vest over the three-year period following the date of grant, unless forfeited, and will be paid out in the form of stock, cash or a combination of both at the Company’s discretion at the end of the three year vesting period. Performance-based RSUs vest based on achieving specific annual performance targets for earnings per share growth and cash flow return on capital over the three calendar year-end periods following the date of grant. Unless forfeited, the performance-based RSUs will be paid out in the form of stock, cash or a combination of both at the Company’s discretion at the end of the three-year performance period if PPG meets the performance targets.

The amount paid upon vesting of performance-based RSUs may range from 0% to 200% of the original grant, based upon the level of earnings per share growth achieved and frequency with which the annual cash flow return on capital performance target is met over the three calendar year periods comprising the vesting period. Performance against the earnings per share growth and the cash flow return on capital goal is calculated annually, and the annual payout for each goal will be weighted equally over the three-year period. The performance-based RSUs granted in 2020 vested at 100%. PPG has assumed that performance-based RSUs granted in 2021 and 2022 will both vest at the 100% level.

RSU Activity	*Number of Shares*	*Weighted Average Grant Date Fair Value*
Outstanding, January 1, 2022	622,055	$125.92
Granted	232,050	$147.77
Vested	(199,642)	$147.36
Forfeited	(65,075)	$122.60
Outstanding, December 31, 2022	589,388	$136.99
Vested or expected to vest, December 31, 2022	563,900	$136.67

There was $20 million of total unrecognized compensation cost related to unvested RSUs outstanding as of December 31, 2022. This cost is expected to be recognized as expense over a weighted average period of 1.5 years.

Contingent Share Grants

The Company also provides grants of contingent shares to selected key executives that may be earned based on PPG's total shareholder return ("TSR") over the three-year period following the date of grant. Contingent share grants (referred to as "TSR awards") are made annually and are paid out at the end of each three-year period based on the Company's performance. Performance is measured by determining the percentile rank of the total shareholder return of PPG common stock in relation to the total shareholder return of the S&P 500 for the three-year period following the date of grant. This comparison group represents the entire S&P 500 Index as it existed at the beginning of the performance period, excluding any companies that have been removed from the index because they ceased to be publicly traded. The payout is based on performance achieved during the three-year period calculated in accordance with the scale set forth in the plan agreement and may range from 0% to 200% of the initial grant. A payout of 100% is earned if the target performance is achieved. Contingent share awards earn dividend equivalents for the award period, which will be paid to participants or credited to the participants' deferred compensation plan accounts with the award payout at the end of the period based on the actual number of contingent shares earned. Any payments made at the end of the award period may be in the form of stock, cash or a combination of both. The TSR awards are classified as liability awards, and compensation expense is recognized over the three-year award period based on the fair value of the awards (giving consideration to the Company's percentile rank of total shareholder return) remeasured in each reporting period until settlement of the awards.

The performance period for the TSR shares granted in 2020 ended on December 31, 2022, and PPG's total shareholder return was measured against that of the S&P 500 over the three-year period. PPG's ranking on this performance measure was at the 28th percentile, resulting in no payout.

As of December 31, 2022, there was $2 million of total unrecognized compensation cost related to outstanding TSR awards based on the current estimate of fair value. This cost is expected to be recognized as expense over a weighted average period of 2.0 years.

20. Revenue Recognition

The Company recognizes revenue when control of the promised goods or services is transferred to the customer and in amounts that the Company expects to collect. The timing of revenue recognition takes into consideration the various shipping terms applicable to the Company's sales. For most transactions, control passes in accordance with agreed upon delivery terms.

The Company delivers products to company-owned stores, home centers and other regional or national consumer retail outlets, paint dealers, concessionaires and independent distributors, company-owned distribution networks, and directly to manufacturing companies and retail customers. Each product delivered to a third party customer is considered to satisfy a performance obligation. Performance obligations generally occur at a point in time and are satisfied when control of the goods passes to the customer. The Company is entitled to collection of the sales price under normal credit terms in the regions in which it operates. Accounts receivable are recognized when there is an unconditional right to consideration. Payment terms vary from customer to customer, depending on creditworthiness, prior payment history and other considerations.

The Company also provides services by applying coatings to customers' manufactured parts and assembled products and by providing technical support to certain customers. Performance obligations are satisfied over time as critical milestones are met and as services are provided. PPG is entitled to payment as the services are rendered. For the years ended December 31, 2022, 2021 and 2020, service revenue constituted less than 5% of total revenue.

Net sales by segment and region for the years ended December 31, 2022, 2021 and 2020 were as follows:

($ in millions)	2022	2021	2020
Performance Coatings			
United States and Canada	$4,718	$4,366	$3,673
EMEA	3,550	3,582	2,861
Asia Pacific	1,118	1,254	1,015
Latin America	1,308	1,131	946
Total	$10,694	$10,333	$8,495
Industrial Coatings			
United States and Canada	$2,666	$2,310	$1,995
EMEA	1,908	1,854	1,467
Asia Pacific	1,705	1,723	1,416
Latin America	679	582	461
Total	$6,958	$6,469	$5,339
Total Net Sales [(1)]			
United States and Canada [(2)]	$7,384	$6,676	$5,668
EMEA	5,458	5,436	4,328
Asia Pacific	2,823	2,977	2,431
Latin America	1,987	1,713	1,407
Total PPG	$17,652	$16,802	$13,834

(1) Net sales to external customers are attributed to geographic regions based upon the location of the operating unit shipping the product.

(2) Net sales recognized in the United States represented 38%, 36%, and 37% of the Company's total Net sales for the years ended December 31, 2022, 2021 and 2020, respectively.

Allowance for Doubtful Accounts

All trade receivables are reported on the consolidated balance sheet at the outstanding principal amount adjusted for any allowance for doubtful accounts and any charge-offs. PPG provides an allowance for doubtful accounts to reduce trade receivables to their estimated net realizable value equal to the amount that is expected to be collected. This allowance is estimated based on historical collection experience, current regional economic and market conditions, the aging of accounts receivable, assessments of current creditworthiness of customers and forward-looking information. The use of forward-looking information is based on certain macroeconomic and microeconomic indicators including, but not limited to, regional business environment risk, political risk, and commercial and financing risks.

PPG reviews its allowance for doubtful accounts on a quarterly basis to ensure the estimate reflects regional risk trends as well as current and future global operating conditions.

The following table summarizes allowance for doubtful accounts activity for the years ended December 31, 2022 and 2021:

	Trade Receivables Allowance for Doubtful Accounts	
($ in millions)	2022	2021
January 1	$31	$44
Bad debt expense	52	19
Recoveries of previously reserved trade receivables	(55)	(14)
Other	3	(18)
December 31	$31	$31

In the first quarter 2022, PPG recorded a bad debt reserve of $43 million associated with the adverse economic impacts of the Russian invasion of Ukraine. Subsequently, the Company released a portion of this previously established bad debt reserve due to the collection of certain trade receivables, resulting in a bad debt reserve related to PPG's operations in Russia of $11 million at December 31, 2022. Refer to Note 7, "Impairment and Other Related Charges, Net" for additional information.

21. Reportable Business Segment Information

Segment Organization and Products

PPG is a multinational manufacturer with 10 operating segments (which the Company refers to as “strategic business units”) that are organized based on the Company’s major products lines. The Company’s reportable business segments include the following two segments: Performance Coatings and Industrial Coatings. The operating segments have been aggregated based on economic similarities, the nature of their products, production processes, end-use markets and methods of distribution.

The Performance Coatings reportable business segment is comprised of the automotive refinish coatings, aerospace coatings, architectural coatings – Americas and Asia Pacific, architectural coatings – EMEA, protective and marine coatings and traffic solutions operating segments. This reportable business segment primarily supplies a variety of protective and decorative coatings, sealants and finishes, along with paint strippers, stains and related chemicals, pavement marking products, transparencies and transparent armor.

The Industrial Coatings reportable business segment is comprised of the automotive OEM coatings, industrial coatings, packaging coatings, and the specialty coatings and materials operating segments. This reportable business segment primarily supplies a variety of protective and decorative coatings and finishes along with adhesives, sealants, metal pretreatment products, optical monomers and coatings, precipitated silicas and other specialty materials.

Production facilities and sales for Performance Coatings and Industrial Coatings are global. PPG’s reportable business segments continue to pursue opportunities to further develop their global reach. Each of the reportable business segments in which PPG is engaged is highly competitive. The diversification of our product lines and the worldwide sales tend to minimize the impact on PPG’s business of changes in demand in a particular industry or in a particular geographic area.

The accounting policies of the operating segments are the same as those described in the summary of significant accounting policies (see Note 1, “Summary of Significant Accounting Policies”). The Company allocates resources to operating segments and evaluates the performance of operating segments based upon segment income, which is income before interest expense – net, income taxes, and noncontrolling interests and excludes certain charges which are considered to be unusual or non-recurring. The Company also evaluates performance of operating segments based on working capital reduction, selling price increases and sales volume growth.

Corporate unallocated costs include the costs of corporate staff functions not directly associated with the operating segments, certain legal matters, net of related insurance recoveries, the cost of certain insurance and stock-based compensation programs and certain other unusual or non-recurring items. The service cost component of net periodic benefit cost related to current employees of each reportable business segment is allocated to that reportable business segment and the remaining portion of net periodic pension expense is included in the Corporate unallocated costs.

Product movement between Performance Coatings and Industrial Coatings is limited, is accounted for as an inventory transfer, and is recorded at cost plus a mark-up, the impact of which is not significant to the net sales or segment income of the reportable business segments.

($ in millions)	2022	2021	2020
Net sales to external customers			
Performance Coatings	$10,694	$10,333	$8,495
Industrial Coatings	6,958	6,469	5,339
Total Net sales	$17,652	$16,802	$13,834
Segment income			
Performance Coatings	$1,399	$1,491	$1,359
Industrial Coatings	643	680	750
Total Segment income	$2,042	$2,171	$2,109
Corporate / Non-Segment Items			
Corporate unallocated	(218)	(194)	(233)
Interest expense, net of interest income	(113)	(95)	(115)
Impairment and other related charges, net[1]	(245)	(21)	(93)
Business restructuring-related costs, net[2]	(75)	(27)	(224)
Transaction-related costs, net[3]	(10)	(86)	(9)
Pension settlement charge	—	(50)	—
Environmental remediation charges, net	—	(35)	(26)
Expense incurred due to natural disasters[4]	—	(17)	(17)
Change in allowance for doubtful accounts related to COVID-19	—	14	(30)
Income from legal settlements	—	22	—
Asbestos-related claims reserve adjustment[5]	—	133	—
Total Income before income taxes	$1,381	$1,815	$1,362

($ in millions)	2022	2021	2020
Depreciation and amortization			
Performance Coatings	$296	$308	$251
Industrial Coatings	207	212	200
Corporate / Non-Segment Items	51	41	58
Total	$554	$561	$509
Share of net earnings of equity affiliates			
Performance Coatings	$7	$5	$3
Corporate / Non-Segment Items	18	10	5
Total	$25	$15	$8
Segment assets[6]			
Performance Coatings	$13,088	$13,395	$11,551
Industrial Coatings	5,802	5,807	5,040
Corporate / Non-Segment Items	1,854	2,149	2,965
Total	$20,744	$21,351	$19,556
Investment in equity affiliates			
Performance Coatings	$42	$33	$31
Industrial Coatings	15	15	15
Corporate / Non-Segment Items	77	78	74
Total	$134	$126	$120
Expenditures for property (including business acquisitions)			
Performance Coatings	$254	$1,698	$1,293
Industrial Coatings	313	784	166
Corporate / Non-Segment Items	65	26	14
Total	$632	$2,508	$1,473

($ in millions)	2022	2021	2020
Geographic Information			
Segment income			
United States and Canada	$819	$865	$855
EMEA	505	612	572
Asia Pacific	332	354	382
Latin America	386	340	300
Total	$2,042	$2,171	$2,109
Property, plant and equipment — net			
United States and Canada	$1,394	$1,377	$1,351
EMEA	943	1,069	857
Asia Pacific	685	702	623
Latin America	306	294	296
Total	$3,328	$3,442	$3,127

(1) In the first quarter 2022, the Company recorded impairment and other related charges due to the wind down of the company's operations in Russia. Subsequently, the Company released a portion of the previously established reserves for Receivables and Inventories due to the collection of certain trade receivables and the realization of certain inventories. Also in 2022, impairment and other related charges were recorded for the write-down of certain assets and liabilities related to the planned sale of a non-core business and for certain asset write downs. In 2021 and 2020, impairment charges were recorded for the write-down of certain assets related to the previously planned sale of certain smaller entities in non-strategic regions. Also in 2020, an impairment charge was recorded to reduce the carrying value of an indefinite-lived trademark.

(2) Included in business restructuring-related costs, net are business restructuring charges, accelerated depreciation of certain assets and other related costs, offset by releases related to previously approved programs and a $34 million gain on the sale of certain assets in 2021 in connection with the Company's manufacturing footprint consolidation plans and associated restructuring programs. This gain is included in Other (income)/charges, net in the consolidated statement of income.

(3) Transaction-related costs, net include advisory, legal, accounting, valuation, other professional or consulting fees, and certain internal costs directly incurred to effect acquisitions. These costs are included in Selling, general and administrative expense in the statement of income. Acquisition-related costs, net also include the impact for the step up to fair value of inventory acquired in certain acquisitions which are included in Cost of Sales, exclusive of depreciation and amortization in the consolidated statement of income.

(4) In 2020, two hurricanes damaged a southern U.S. factory supporting the Company's specialty coatings and materials business. In early 2021, a winter storm further damaged that factory as well as other company factories in the southern U.S. Incremental expenses incurred due to these storms included costs related to maintenance and repairs of damaged property, freight and utility premiums and other incremental expenses directly related to the impacted areas.

(5) In 2021, the reserve for asbestos-related claims was reduced to reflect the Company's current estimate of potential liability for these claims.

(6) Segment assets are the total assets used in the operation of each segment. Corporate assets principally include amounts recorded in Cash and cash equivalents, Deferred income taxes, and Property, plant and equipment, net on the consolidated balance sheet.

Item 9. Changes in and Disagreements With Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

(a) Evaluation of disclosure controls and procedures.

Based on their evaluation as of the end of the period covered by this Form 10-K, the Company’s principal executive officer and principal financial officer have concluded that the Company’s disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934 (the “Exchange Act”)) are effective to ensure that information required to be disclosed by the Company in reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in Securities and Exchange Commission rules and forms and to ensure that information required to be disclosed by the Company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the Company’s management, including its principal executive and principal financial officers, as appropriate, to allow timely decisions regarding required disclosure.

(b) Changes in internal control over financial reporting.

There were no changes in the Company’s internal control over financial reporting that occurred during the Company’s quarter ended December 31, 2022 that have materially affected, or are reasonably likely to materially affect, the Company’s internal control over financial reporting.

(c) Management report on internal control over financial reporting.

Refer to Management Report on page 32 for management’s annual report on internal control over financial reporting. Refer to Report of Independent Registered Public Accounting Firm on pages 30-31 for PricewaterhouseCoopers LLP’s audit report on the Company’s internal control over financial reporting.

Item 9B. Other Information

None.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

Not applicable.

Part III

Item 10. Directors, Executive Officers and Corporate Governance

The information about the Company’s directors required by Item 10 and not otherwise set forth below is contained under the caption “Proposal 1: Election of Directors” in PPG’s definitive Proxy Statement for the 2023 Annual Meeting of Shareholders (the “Proxy Statement”) which the Company anticipates filing with the Securities and Exchange Commission, pursuant to Regulation 14A, not later than 120 days after the end of the Company’s fiscal year, and is incorporated herein by reference.

The executive officers of the Company are elected by the Board of Directors. The information required by this item concerning the Company’s executive officers is incorporated by reference herein from Part I of this report under the caption “Information About Our Executive Officers.”

Information regarding the Company’s Audit Committee is included in the Proxy Statement under the caption “Corporate Governance – Audit Committee” and is incorporated herein by reference.

Information regarding the Company’s codes of ethics is included in the Proxy Statement under the caption “Corporate Governance – Codes of Ethics” and is incorporated herein by reference.

Item 11. Executive Compensation

The information required by Item 11 is contained in the Proxy Statement under the captions “Compensation of Directors,” “Compensation Discussion and Analysis,” “Compensation of Executive Officers,” “Potential Payments upon Termination or Change in Control,” “Corporate Governance – Compensation Committee Interlocks and Insider Participation,” and “Corporate Governance – Human Capital Management and Compensation Committee Report to Shareholders” and is incorporated herein by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by Item 12 is contained in the Proxy Statement under the captions “Beneficial Ownership” and “Equity Compensation Plan Information” and is incorporated herein by reference.

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by Item 13 is contained in the Proxy Statement under the captions “Corporate Governance – Director Independence,” “Corporate Governance – Review and Approval or Ratification of Transactions with Related Persons” and “Corporate Governance – Certain Relationships and Related Transactions” and is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services

The information required by Item 14 is contained in the Proxy Statement under the caption “Independent Registered Public Accounting Firm” and is incorporated herein by reference.

Part IV

Item 15. Exhibits, Financial Statement Schedules

(a)(1) Consolidated Financial Statements and Reports of Independent Registered Public Accounting Firm (see Part II, Item 8 of this Form 10-K).

The following information is filed as part of this Form 10-K:

(a)(2) Consolidated Financial Statement Schedule for the years ended December 31, 2022, 2021 and 2020.

The following Consolidated Financial Statement Schedule should be read in conjunction with the previously referenced financial statements:

Schedule II – Valuation and Qualifying Accounts

Allowance for Doubtful Accounts for the Years Ended December 31, 2022, 2021, and 2020

($ in millions)	*Balance at Beginning of Year*	*Charged to Costs and Expenses(1)*	*Deductions(1, 2)*	*Balance at End of Year*
2022	$31	$52	($52)	$31
2021	$44	$5	($18)	$31
2020	$22	$44	($22)	$44

(1) In the first quarter 2022, PPG recorded a bad debt reserve of $43 million associated with the adverse economic impacts of the Russian invasion of Ukraine. Subsequently, the Company released a portion of this previously established bad debt reserve due to the collection of certain trade receivables. In 2020, PPG recorded an allowance for doubtful accounts of $30 million related to the potential financial impacts of COVID-19. In 2021, PPG released a portion of the previously established reserve due to improvement in economic conditions in certain countries and a slower pattern of bankruptcies than expected.

(2) Notes and accounts receivable written off as uncollectible, net of recoveries, amounts attributable to divestitures and changes attributable to foreign currency translation.

All other schedules are omitted because they are not applicable.

(a)(3) Exhibits. The following exhibits are filed as a part of, or incorporated by reference into, this Form 10-K.

Index to Exhibits

	3	Statement with Respect to Shares Eliminating the Series A Junior Participating Preferred Stock, was filed as Exhibit 3.1 to the Registrant's Quarterly Report on Form 10-Q for the period ended September 30, 2014.
	3.1	Restated Articles of Incorporation of PPG Industries, Inc., was filed as Exhibit 3.2 to the Registrant's Quarterly Report on Form 10-Q for the period ended September 30, 2014.
	3.2	Articles of Amendment to the Restated Articles of Incorporation of PPG Industries, Inc., effective May 13, 2022, was filed as Exhibit 3.1 to the Registrant's Current Report on Form 8-K filed on May 13, 2022.
	3.3	Amended and Restated Bylaws of PPG Industries, Inc., as amended on October 20, 2022, was filed as Exhibit 3.1 to the Registrant's Current Report on Form 8-K filed on October 25, 2022.
	4	Indenture, dated as of March 18, 2008, was filed as Exhibit 4.1 to the Registrant's Current Report on Form 8-K filed on March 18, 2008.
	4.1	Supplemental Indenture, dated as of March 18, 2008, was filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed on March 18, 2008.
	4.2	Second Supplemental Indenture, dated as of November 12, 2010, was filed as Exhibit 4.3 to the Registrant's Current Report on Form 8-K filed on November 12, 2010.
	4.3	Third Supplemental Indenture, dated as of August 3, 2012, was filed as Exhibit 4.4 to the Registrant's Current Report on Form 8-K filed on August 3, 2012.
	4.4	Fifth Supplemental Indenture, dated as of March 13, 2015, between PPG Industries, Inc. and The Bank of New York Mellon Trust Company, N.A., as trustee, was filed as Exhibit 4.3 to the Registrant's Current Report on Form 8-K filed on March 13, 2015.
	4.5	Sixth Supplemental Indenture, dated as of November 3, 2016, between PPG Industries, Inc. and The Bank of New York Mellon Trust Company, N.A., as trustee, was filed as Exhibit 4.3 to the Registrant's Current Report on Form 8-K filed on November 3, 2016.
	4.6	Seventh Supplemental Indenture, dated as of February 27, 2018, between PPG Industries, Inc. and The Bank of New York Mellon Trust Company, N.A., as trustee, was filed as Exhibit 4.3 to the Registrant's Current Report on Form 8-K filed on February 27, 2018.
	4.7	Eighth Supplemental Indenture, dated as of August 15, 2019, between PPG Industries, Inc. and The Bank of New York Mellon Trust Company, N.A., was filed as Exhibit 4.3 to the Registrant's Current Report on Form 8-K filed on August 15, 2019.
	4.8	Ninth Supplemental Indenture, dated as of May 19, 2020, between PPG Industries, Inc. and The Bank of New York Mellon Trust Company, N.A., as trustee, was filed as Exhibit 4.3 to the Registrant's Current Report on Form 8-K filed on May 19, 2020.
	4.9	Tenth Supplemental Indenture, dated as of March 4, 2021, between PPG Industries, Inc. and The Bank of New York Mellon Trust Company, N.A., as trustee, was filed as Exhibit 4.3 to the Registrant's Current Report on Form 8-K filed on March 4, 2021.
	4.10	Eleventh Supplemental Indenture, dated as of May 25, 2022, between PPG Industries, Inc. and The Bank of New York Mellon Trust Company, N.A., as trustee, was filed as Exhibit 4.3 to the Registrant's Current Report on Form 8-K filed on May 25, 2022.
†	4.11	PPG Industries, Inc. Description of Securities.
*	10	PPG Industries, Inc. Nonqualified Retirement Plan, as amended and restated September 24, 2008, was filed as Exhibit 10 to the Registrant's Annual Report on Form 10-K for the period ended December 31, 2011.
*	10.1	Form of Change in Control Employment Agreement entered into with executives prior to January 1, 2008, as amended, was filed as Exhibit 10.2 to the Registrant's Annual Report on Form 10-K for the period ended December 31, 2007.
*	10.2	Form of Change in Control Employment Agreement entered into with executives on or after January 1, 2008 through December 31, 2009, was filed as Exhibit 10.24 to the Registrant's Annual Report on Form 10-K for the period ended December 31, 2007.
*	10.3	Form of Change in Control Employment Agreement entered into with executives on or after January 1, 2010, was filed as Exhibit 10.3 to the Registrant's Annual Report on Form 10-K for the period ended December 31, 2009.
*	10.4	Form of Change in Control Employment Agreement entered into with executives on or after June 30, 2012 was filed as Exhibit 10.4 to the Registrant's Annual Report on Form 10-K for the period ended December 31, 2012.

*	10.5	Form of Change in Control Employment Agreement entered into with executives on or after January 1, 2014, was filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the period ended March 31, 2014.
*	10.6	PPG Industries, Inc. Deferred Compensation Plan for Directors related to compensation deferred prior to January 1, 2005, was filed as Exhibit 10.3 to the Registrant's Annual Report on Form 10-K for the period ended December 31, 1997.
*	10.7	PPG Industries, Inc. Deferred Compensation Plan for Directors related to compensation deferred on or after January 1, 2005, as amended and restated effective January 1, 2021, was filed as Exhibit 10 to the Registrant's Quarterly Report on Form 10-Q for the period ended September 30, 2020.
*	10.8	PPG Industries, Inc. Deferred Compensation Plan related to compensation deferred prior to January 1, 2005, as amended effective July 14, 2004, was filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the period ended June 30, 2004.
*	10.9	PPG Industries, Inc. Deferred Compensation Plan related to compensation deferred on or prior to January 1, 2005, as amended and restated effective January 1, 2011, was filed as Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q for the period ended June 30, 2012.
*	10.10	PPG Industries, Inc. Executive Officers' Long Term Incentive Plan was filed as Exhibit 10.1 to the Registrant's Current Report on Form 8-K dated February 15, 2005.
*	10.11	PPG Industries, Inc. Amended and Restated Omnibus Incentive Plan, was filed as Annex A to the Registrant's Definitive Proxy Statement for its 2011 Annual Meeting of Shareholders filed on March 10, 2011.
*	10.12	PPG Industries, Inc. Amended and Restated Omnibus Incentive Plan, was filed as Annex B to the Registrant's Definitive Proxy Statement for its 2016 Annual Meeting of Shareholders filed on March 10, 2016.
*	10.13	Form of Non-Qualified Stock Option Award Agreement, was filed as Exhibit 10.4 to the Registrant's Quarterly Report on Form 10-Q for the period ended June 30, 2011.
*	10.14	Form of Non-Qualified Stock Option Award Agreement, was filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the period ended March 31, 2013.
*	10.15	Form of TSR Share Award Agreement, was filed as Exhibit 10.6 to the Registrant's Quarterly Report on Form 10-Q for the period ended March 31, 2013.
*	10.16	Form of Performance-Based Restricted Stock Unit Award Agreement, was filed as Exhibit 10.4 to the Registrant's Quarterly Report on Form 10-Q for the period ended March 31, 2013.
*	10.17	Form of Performance-Based Restricted Stock Unit Award Agreement for Key Employees, was filed as Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q for the period ended March 31, 2013.
*	10.18	Form of Time-Vested Restricted Stock Unit Award Agreement, was filed as Exhibit 10.5 to the Registrant's Quarterly Report on Form 10-Q for the period ended March 31, 2013.
*	10.19	Form of Time-Vested Restricted Stock Unit Award Agreement for Directors, was filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the period ended June 30, 2022.
	10.20	Amended and Restated Five Year Credit Agreement dated as of August 30, 2019 among PPG Industries, Inc.; the several banks and financial institutions party thereto; JPMorgan Chase Bank, N.A., as administrative agent; BNP Paribas, Citibank, N.A. MUFG Bank, Ltd. and PNC Bank, National Association, as co-syndication agents; and J.P. Morgan Chase Bank, N.A., BNP Paribas Securities Corp., Citibank, N.A., MUFG Bank, Ltd. and PNC Capital Markets LLC, as co-lead arrangers and co-bookrunners, was filed as Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed on September 4, 2019.
	10.21	Term Loan Credit Agreement, dated as of February 19, 2021, among PPG Industries, Inc., the lenders parties thereto, BNP Paribas, as administrative agent, PNC Bank, National Association as syndication agent and BNP Paribas Securities Corp. and PNC Capital Markets LLC as co-lead arrangers and co-bookrunners was filed as Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed on February 23, 2021.
*	10.22	Letter Agreement with Amy R. Ericson was filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the period ended September 30, 2018.
*	10.23	PPG Industries, Inc. Incentive Compensation Plan for Key Employees, as amended and restated on January 1, 2019 was filed as Exhibit 10.29 to the Registrant's Annual Report on Form 10-K for the period ended December 31, 2018.
*	10.24	PPG Industries, Inc. Management Award Plan, as amended and restated on January 1, 2019 was filed as Exhibit 10.30 to the Registrant's Annual Report on Form 10-K for the period ended December 31, 2018.
†*	10.25	Time-Vested Restricted Stock Unit Award Agreement for Michael H. McGarry.
†	13.1	Market Information, Dividends, Holders of Common Stock and Stock Performance Graph.

†	21	Subsidiaries of the Registrant.
†	23	Consent of PricewaterhouseCoopers LLP.
†	24	Powers of Attorney.
†	31.1	Certification of Principal Executive Officer Pursuant to Rule 13a-14(a) or 15d-14(a) of the Exchange Act, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
†	31.2	Certification of Principal Financial Officer Pursuant to Rule 13a-14(a) or 15d-14(a) of the Exchange Act, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
††	32.1	Certification of Chief Executive Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
††	32.2	Certification of Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
**	101.INS	Inline XBRL Instance Document
**	101.SCH	Inline XBRL Taxonomy Extension Schema Document
**	101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document
**	101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document
**	101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document
**	101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document
	104	Inline XBRL for the cover page of this Annual Report on Form 10-K, included in the Exhibit 101 Inline XBRL Document Set.

† Filed herewith.
†† Furnished herewith.

* Management contracts, compensatory plans or arrangements required to be filed as an exhibit hereto pursuant to Item 601 of Regulation S-K.

** Attached as Exhibit 101 to this report are the following documents formatted in Inline XBRL (Extensible Business Reporting Language) as of and for the year ended December 31, 2022: (i) the Consolidated Statement of Income, (ii) the Consolidated Balance Sheet, (iii) the Consolidated Statement of Shareholders' Equity, (iv) the Consolidated Statement of Comprehensive Income (Loss), (v) the Consolidated Statement of Cash Flows, (vi) Notes to Consolidated Financial Statements and (vii) Financial Schedule of Valuation and Qualifying Accounts.

Item 16. Form 10-K Summary

None.

Signatures

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized on February 16, 2023.

PPG INDUSTRIES, INC.
(Registrant)

By: /s/ Vincent J. Morales
Vincent J. Morales
Senior Vice President and Chief Financial Officer (Principal Financial Officer and Duly Authorized Officer)

By: /s/ Brian R. Williams
Brian R. Williams
Vice President and Controller (Principal Accounting Officer and Duly Authorized Officer)

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed by the following persons on behalf of the Registrant and in the capacities indicated on February 16, 2023.

Signature	Capacity
/s/ Timothy M. Knavish Timothy M. Knavish	Director, President and Chief Executive Officer
/s/ Vincent J. Morales Vincent J. Morales	Senior Vice President and Chief Financial Officer (Principal Financial Officer and Duly Authorized Officer)
/s/ Brian R. Williams Brian R. Williams	Vice President and Controller (Principal Accounting Officer and Duly Authorized Officer)

S. F. Angel	Director
H. Grant	Director
M. L. Healey	Director
G. R. Heminger	Director
M. W. Lamach	Director
K. A. Ligocki	Director
M.H. McGarry	Executive Chairman and Director
M. T. Nally	Director
G. Novo	Director
M. H. Richenhagen	Director
C. R. Smith	Director

By: /s/ Vincent J. Morales
Vincent J. Morales, Attorney-in-Fact

DESCRIPTION OF THE REGISTRANT'S SECURITIES REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

As of February 16, 2023, PPG Industries, Inc. (the "Company") has five classes of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"): (1) its common stock, par value $1.66 2/3 per share (the "Common Stock"); (2) its 0.875% Notes due 2025 (the "2025 Notes"); (3) its 1.875% Notes due 2025 (the "2025A Notes"); (4) its 1.400% Notes due 2027 (the "2027 Notes"); and (5) its 2.750% Notes due 2029 (the "2029 Notes" and together with the 2025 Notes and the 2027 Notes, the "Notes").

Description of the Common Stock

The following description of the Common Stock is a summary and does not purport to be complete. It is subject to and qualified in its entirety by reference to the Company's Restated Articles of Incorporation, as amended (the "Articles of Incorporation"), and the Company's Amended and Restated Bylaws (the "Bylaws"), each of which are incorporated by reference as an exhibit to the Annual Report on Form 10-K of which this Exhibit 4.11 is a part. The Company encourages interested parties to read the Articles of Incorporation, the Bylaws and the applicable provisions of the Pennsylvania Business Corporation Law for additional information.

Authorized Capital Shares

The Company's authorized capital shares consist of 1,200,000,000 shares of Common Stock and 10,000,000 shares of preferred stock, without par value (the "Preferred Stock"). The outstanding shares of the Common Stock are fully paid and nonassessable.

Voting Rights

Holders of the Common Stock are entitled to one vote per share on all matters submitted to a vote of the Company's shareholders, including the election of directors. There are no cumulative voting rights associated with the Common Stock.

Dividend Rights

Subject to the rights of holders of outstanding shares of the Preferred Stock, if any, the holders of the Common Stock are entitled to receive dividends when, as and if declared by the Company's Board of Directors in its discretion out of funds legally available for the payment of dividends.

Liquidation Rights

Subject to any preferential rights of outstanding shares of the Preferred Stock, if any, holders of the Common Stock will be entitled to share ratably in any of the Company's assets legally available for distribution to the Company's shareholders after the payment in full of all debts and distributions in the event of the dissolution of the Company.

Other Rights and Preferences

There are no sinking fund or redemption provisions or preemptive, conversion or exchange rights applicable to the Common Stock.

Listing

The Common Stock is listed on The New York Stock Exchange and trades under the symbol "PPG."

Description of the Notes

The following description of the Notes is a summary and does not purport to be complete. It is subject to and qualified in its entirety by reference to the Indenture, dated as of March 18, 2008 (the "Base Indenture"), between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee (the "Trustee"), as supplemented by (i) the First Supplemental Indenture, dated as of March 18, 2008 (the "First Supplemental Indenture"), (ii) in the case of the 2027 Notes, also by the Fifth Supplemental Indenture, dated as of March 13, 2015 (the "Fifth Supplemental Indenture"), (iii) in the case of the 2025 Notes, also by the Sixth Supplemental Indenture, dated as of November 3, 2016 (the "Sixth Supplemental Indenture") and (iv) in the case of the 2025A Notes and the 2027 Notes, also by the Eleventh Supplemental Indenture, dated as of May 25, 2022 (the "Eleventh Supplemental Indenture"). The Base Indenture, the First Supplemental Indenture, the Fifth Supplemental Indenture, the Sixth Supplemental Indenture and the Eleventh Supplemental Indenture are incorporated by reference as exhibits to the Annual Report on Form 10-K of which this Exhibit 4.11 is a part. The 2025 Notes, the 2025A Notes, the 2027 Notes and the 2029 Notes each are listed on The New York Stock Exchange and trade under the bond trading symbols of "PPG25", "PPG25A", "PPG27" and "PPG29A," respectively.

In the following description, the Base Indenture as supplemented through the date of the filing of the Annual Report on Form 10-K of which this Exhibit 4.11 is a part is referred to as the "Indenture." The Company encourages interested parties to read the Indenture for additional information.

General

The 2025 Notes and the 2027 Notes each initially were issued in the aggregate principal amount of €600,000,000. The 2025A Notes initially were issued in the aggregate principal amount of €300,000,000 and the 2029 Notes initially were issued in the aggregate principal amount of €700,000,000. The Company is permitted to issue additional Notes of each series without the consent of the holders of that series, but the Company will not issue such additional Notes unless they are fungible for U.S. federal income tax purposes with the relevant series of Notes or are issued under a different CUSIP number. As of February 16, 2023, no such additional Notes have been issued.

The Notes are the Company's direct, unsecured and unsubordinated obligations and rank equally and ratably with all of the Company's other unsecured and unsubordinated indebtedness. The Notes are effectively subordinated to all of the Company's current and future secured indebtedness.

The maturity dates of the 2025A Notes, 2025 Notes, 2027 Notes, and the 2029 Notes are June 1, 2025, November 3, 2025, March 13, 2027 and June 1, 2029, respectively.

The Notes of each series are in the form of one or more global notes that the Company has deposited with or on behalf of a common depositary for the accounts of Clearstream Banking, société anonyme ("Clearstream") and Euroclear Bank, S.A./N.V. ("Euroclear") and are registered in the name of the nominee of the common depositary. The Company has appointed The Bank of New York Mellon, London Branch to act as paying agent, registrar and transfer agent in connection with the Notes, as well as to serve as the common depositary for the Notes. The Bank of New York Mellon, London Branch is an affiliate of the Trustee. The term "paying agent" includes The Bank of New York Mellon, London Branch and any successors appointed from time to time in accordance with the provisions of the Indenture. The Company has designated as an agency where the Notes may be presented for payment, exchange or registration of transfer, in each case as provided in the Indenture, the office of the paying agent at One Canada Square, London E14 5AL.

The Notes of each series were issued in euro and only in minimum denominations of €100,000 and integral multiples of €1,000 in excess thereof.

The Notes are not redeemable at the option of the holder prior to maturity and are not subject to any sinking fund.

Interest and Principal

The 2027 Notes bear interest from March 13, 2015 at a fixed interest rate of 1.400% per annum. The 2025 Notes bear interest from November 3, 2016 at a fixed interest rate of 0.875% per annum. The 2025A Notes bear interest from June 1, 2022 at a fixed interest rate of 1.875% per annum. The 2029 Notes bear interest from June 1, 2022 at a fixed interest rate of 2.750% per annum. Interest is paid annually on June 1 for the 2025A Notes and the 2025 Notes, March 13 for the 2027 Notes, and on November 3 for the 2025 Notes, including on the maturity date of each series of Notes (each an "interest payment date"). The Company will pay interest on the Notes to the persons in whose names the Notes are registered at the close of business on the February 26 or October 19, as applicable (in each case, whether or not a business day), immediately preceding the related interest payment date. Interest on each series of Notes will be computed on the basis of the actual number of days in the period for which interest is being calculated and the actual number of days from and including the last date on which interest was paid on the applicable series of Notes, to but excluding the next date on which interest is paid or duly provided for. This payment convention is referred to as ACTUAL/ACTUAL (ICMA) as defined in the rulebook of the International Capital Market Association.

The Company will pay the principal of and interest on each note to the registered holder in euro in immediately available funds; *provided* that, if the euro is unavailable to the Company due to the imposition of exchange controls or other circumstances beyond the Company's control or if the euro is no longer being used by the then member states of the Eurozone (other than Greece) or for the settlement of transactions by public institutions of or within the international banking community, then all payments in respect of the Notes will be made in U.S. dollars until the euro is again available to the Company or so used. In such circumstances, the amount payable on any date in euro will be converted into U.S. dollars on the basis of the most recently available market exchange rate for euro, as determined by the Company in its sole discretion. Any payment in respect of the Notes so made in U.S. dollars will not constitute an event of default under any series of the Notes or the Indenture. So long as the Notes of a particular series are in book-entry form, the Company will make payments of principal and interest with respect to that series of Notes through the London paying agent described below.

Optional Redemption

Prior to August 3, 2025, the 2025 Notes are redeemable in whole or in part, at the Company's option, at any time and from time to time at a redemption price equal to the greater of (i) 100% of the principal amount of the 2025 Notes to be redeemed and (ii) the sum of the present values of the Remaining Scheduled Payments of principal and interest thereon discounted to the redemption date on an annual basis (ACTUAL/ACTUAL (ICMA)) at the applicable Comparable Government Bond Rate, plus 15 basis points, plus accrued interest thereon to the date of redemption. On or after August 3, 2025, the Company may redeem some or all of the 2025 notes, in whole or in part, at its option, at any time and from time to time at a redemption price equal to 100% of the principal amount of the notes to be redeemed, plus accrued interest thereon to the date of redemption.

Prior to May 1, 2025, the 2025A Notes are redeemable in whole or in part, at the Company's option, at any time and from time to time at a redemption price equal to the greater of (i) 100% of the principal amount of the 2025A Notes to be redeemed and (ii) the sum of the present values of the Remaining Scheduled Payments of principal and interest thereon discounted to the redemption date on an annual basis (ACTUAL/ACTUAL (ICMA)) at the applicable Comparable Government Bond Rate, plus 25 basis points, plus accrued interest thereon to the date of redemption. On or after May 1, 2025, the Company may redeem some or all of the 2025A notes, in whole or in part, at its option, at any time and from time to time at a redemption price equal to 100% of the principal amount of the notes to be redeemed, plus accrued interest thereon to the date of redemption.

Prior to December 13, 2026, the 2027 Notes are redeemable in whole or in part, at the Company's option, at any time and from time to time at a redemption price equal to the greater of (i) 100% of the principal amount of the notes to be redeemed and (ii) the sum of the present values of the Remaining Scheduled Payments of principal and interest thereon discounted to the redemption date on an annual basis (ACTUAL/ACTUAL (ICMA)) at the applicable Comparable Government Bond Rate, plus 20 basis points, plus accrued interest thereon to the date of redemption. On or after December 13, 2026, the Company may redeem some or all of the 2027 Notes, in whole or in part, at its option, at any time and from time to time at a redemption price equal to 100% of the principal amount of the 2027 Notes to be redeemed, plus accrued interest thereon to the date of redemption.

Prior to April 1, 2029, the 2029 Notes are redeemable in whole or in part, at the Company's option, at any time and from time to time at a redemption price equal to the greater of (i) 100% of the principal amount of the 2029 Notes to be redeemed and (ii) the sum of the present values of the Remaining Scheduled Payments of principal and interest thereon discounted to the redemption date on an annual basis (ACTUAL/ACTUAL (ICMA)) at the applicable Comparable Government Bond Rate, plus 30 basis points, plus accrued interest thereon to the date of redemption. On or after April 1, 2029, the Company may redeem some or all of the 2029 notes, in whole or in part, at its option, at any time and from time to time at a redemption price equal to 100% of the principal amount of the notes to be redeemed, plus accrued interest thereon to the date of redemption.

The redemption price for the Notes will include, in each case, accrued and unpaid interest on the principal amount of the Notes to be redeemed to the redemption date. The redemption price paid for the Notes upon any such redemption will be paid in euro.

"Comparable Government Bond Rate" means, with respect to any redemption date for each series of Notes, the price, expressed as a percentage (rounded to three decimal places, with 0.0005 being rounded upwards), at which the gross redemption yield on the notes to be redeemed, if they were to be purchased at such price on the third business day prior to the date fixed for redemption, would be equal to the gross redemption yield on such business day of the Comparable Government Bond (as defined below) on the basis of the middle market price of the Comparable Government Bond prevailing at 11:00 a.m. (London time) on such business day as determined by an independent investment bank selected by the Company.

"Comparable Government Bond" means, with respect to each series of Notes, in relation to any Comparable Government Bond Rate calculation, at the discretion of an independent investment bank selected by us, a German government bond whose maturity is closest to the maturity of the Notes to be redeemed, or if such independent investment bank in its discretion determines that such similar bond is not in issue, such other German government bond as such independent investment bank may, with the advice of three brokers of, and/or market makers in, German government bonds selected by the Company, determine to be appropriate for determining the Comparable Government Bond Rate.

“Remaining Scheduled Payments” means, with respect to each series of Notes to be redeemed, the remaining scheduled payments of the principal thereof and interest thereon that would be due after the related redemption date but for such redemption; *provided, however*, that, if such redemption date is not an interest payment date with respect to such Notes, the amount of the next succeeding scheduled interest payment thereon will be deemed to be reduced by the amount of interest accrued thereon to such redemption date.

Unless the Company defaults in payment of the applicable redemption price, on and after the redemption date, interest will cease to accrue on the Notes or portions thereof called for redemption. If less than all of any series of Notes are to be redeemed, the Notes of the series to be redeemed will be selected by the trustee by such method the trustee deems to be fair and appropriate in accordance with applicable depositary procedures.

Redemption for Tax Reasons

If, as a result of any change in, or amendment to, the laws (or any regulations or rulings promulgated under the laws) of the United States (or any taxing authority in the United States), or any change in, or amendments to, an official position regarding the application or interpretation of such laws, regulations or rulings, the Company becomes or, based upon a written opinion of independent counsel selected by the Company, the Company will become obligated to pay additional amounts as described below under the heading “- Payment of Additional Amounts” with respect to the Notes, then the Company may at any time at the Company’s option redeem, in whole, but not in part, the Notes at a redemption price equal to 100% of their principal amount, together with accrued and unpaid interest (including any additional amounts) on those Notes to, but not including, the date fixed for redemption.

Payment of Additional Amounts

The Company will, subject to the exceptions and limitations set forth below, pay as additional interest on the Notes of each series such additional amounts as are necessary in order that the net amount of the principal of and interest on the Notes received by a beneficial owner who is not a United States person (as defined below), after withholding or deduction for any present or future tax, assessment or other governmental charge imposed by the United States or a taxing authority in the United States, will not be less than the amount that would have been received by such beneficial owner if such tax had not been withheld or deducted; provided, however, that the foregoing obligation to pay additional amounts shall not apply:

1. to any tax, assessment or other governmental charge that is imposed by reason of the holder (or the beneficial owner for whose benefit such holder holds such Note), or a fiduciary, settlor, beneficiary, member or shareholder of the holder or beneficial owner if the holder or beneficial owner is an estate, trust, partnership or corporation, or a person holding a power over an estate or trust administered by a fiduciary holder, being considered as:

    a. being or having been engaged in a trade or business in the United States or having or having had a permanent establishment in the United States;

    b. having a current or former connection with the United States (other than a connection arising solely as a result of the ownership of the notes, the receipt of any payment or the enforcement of any rights hereunder), including being or having been a citizen or resident of the United States;

c. being or having been a personal holding company, a passive foreign investment company or a controlled foreign corporation for United States income tax purposes or a corporation that has accumulated earnings to avoid United States federal income tax; or

d. being or having been a “10-percent shareholder” of the Company as defined in section 871(h)(3) of the United States Internal Revenue Code of 1986, as amended (the “Code”) or any successor provision;

2. to any holder that is not the sole beneficial owner of the Notes, or a portion of the Notes, or that is a fiduciary, partnership or limited liability company, but only to the extent that a beneficial owner with respect to the holder, a beneficiary or settlor with respect to the fiduciary, or a beneficial owner or member of the partnership or limited liability company would not have been entitled to the payment of an additional amount had the beneficiary, settlor, beneficial owner or member received directly its beneficial or distributive share of the payment;

3. to any tax, assessment or other governmental charge that would not have been imposed but for the failure of the holder or any other person to comply with certification, identification or information reporting requirements concerning the nationality, residence, identity or connection with the United States of the holder or beneficial owner of the Notes, if compliance is required by statute, by regulation of the United States or any taxing authority therein or by an applicable income tax treaty to which the United States is a party as a precondition to exemption from such tax, assessment or other governmental charge;

4. to any tax, assessment or other governmental charge that is imposed otherwise than by withholding by the Company or a paying agent from the payment;

5. to any tax, assessment or other governmental charge that would not have been imposed but for a change in law, regulation, or administrative or judicial interpretation that
becomes effective more than 15 days after the payment becomes due or is duly provided for, whichever occurs later;

6. to any estate, inheritance, gift, sales, excise, transfer, wealth, capital gains or personal property tax or similar tax, assessment or other governmental charge;

7. to any tax, assessment or other governmental charge required to be withheld by any paying agent from any payment of principal of or interest on any note, if the holder or beneficial owner would have been able to avoid such withholding by presenting the Note (where presentation is required) to another available paying agent;

8. to any tax, assessment or other governmental charge that would not have been imposed but for the presentation by the holder of any Note, where presentation is required, for payment on a date more than 30 days after the date on which payment became due and payable or the date on which payment thereof is duly provided for, whichever occurs later;

9. to any tax, assessment or other governmental charge that is imposed or withheld solely by reason of the beneficial owner being a bank (i) purchasing the Notes in the ordinary course of its lending business or (ii) that is neither (A) buying the Notes for investment purposes only nor (B)

buying the Notes for resale to a third-party that either is not a bank or holding the Notes for investment purposes only;

10. to any tax, assessment or other governmental charge imposed under Sections 1471 through 1474 of the Code (or any amended or successor provisions), any current or future regulations or official interpretations thereof, any agreement entered into pursuant to Section 1471(b) of the Code or any fiscal or regulatory legislation, rules or practices adopted pursuant to any intergovernmental agreement entered into in connection with the implementation of such sections of the Code; or

11. in the case of any combination of items (1), (2), (3), (4), (5), (6), (7), (8), (9) and (10).

The Notes are subject in all cases to any tax, fiscal or other law or regulation or administrative or judicial interpretation applicable to the Notes. Except as specifically provided under this heading, the Company will not be required to make any payment for any tax, assessment or other governmental charge imposed by any government or a political subdivision or taxing authority of or in any government or political subdivision with respect to the Notes.

As used under this heading and under the heading "-Redemption for Tax Reasons," the term "United States" means the United States of America, the states of the United States, the District of Columbia, and any political subdivision thereof, and the term "United States person" means any individual who is a citizen or resident of the United States for U.S. federal income tax purposes, a corporation, partnership or other entity created or organized in or under the laws of the United States, any state of the United States or the District of Columbia (other than a partnership that is not treated as a United States person under any applicable Treasury regulations), or any estate or trust the income of which is subject to United States federal income taxation regardless of its source.

Book-Entry and Settlement

The Company has obtained the information under this heading "- Book-Entry and Settlement" concerning Clearstream and Euroclear and their book-entry systems and procedures from sources that the Company believes to be reliable. The Company takes no responsibility for an accurate portrayal of this information. In addition, the description of the clearing systems under this heading "- Book-Entry and Settlement" reflects the Company's understanding of the rules and procedures of Clearstream and Euroclear as they are currently in effect. Those clearing systems could change their rules and procedures at any time.

The Notes of each series are represented by one or more fully registered global notes. Each such global note has been deposited with, or on behalf of, a common depositary, and registered in the name of the nominee of the common depositary for the accounts of Clearstream and Euroclear. Each such global security was deposited with The Bank of New York Mellon, as common depositary (the "Common Depositary") and registered in the name of the Common Depositary or its nominee.

Except as set forth below, the global notes may be transferred, in whole and not in part, only to Euroclear or Clearstream or their respective nominees. A holder may hold its interests in the global notes in Europe through Clearstream or Euroclear, either as a participant in such systems or indirectly through organizations which are participants in such systems. Clearstream and Euroclear will hold interests in the global notes on behalf of their respective participating organizations or customers through customers' securities accounts in Clearstream's or Euroclear's names on the books of their respective depositaries. Book-entry interests in the Notes and all transfers relating to the Notes are reflected in the book-entry records of Clearstream and Euroclear. The address of Clearstream is 42 Avenue JF Kennedy, L-1855

Luxembourg, Luxembourg, and the address of Euroclear is 1 Boulevard Roi Albert II, B-1210 Brussels, Belgium.

Any secondary market trading of book-entry interests in the Notes will take place through Clearstream and Euroclear participants and will settle in same-day funds. Owners of book-entry interests in the Notes will receive payments relating to their Notes in euro, except as described above.

Clearstream and Euroclear have established electronic securities and payment transfer, processing, depositary and custodial links among themselves and others, either directly or through custodians and depositaries. These links allow the Notes to be issued, held and transferred among the clearing systems without the physical transfer of certificates. Special procedures to facilitate clearance and settlement have been established among these clearing systems to trade securities across borders in the secondary market.

The policies of Clearstream and Euroclear will govern payments, transfers, exchanges and other matters relating to the investor's interest in the Notes held by them. The Company has no responsibility for any aspect of the records kept by Clearstream or Euroclear or any of their direct or indirect participants. The Company also does not supervise these systems in any way.

Clearstream and Euroclear and their participants perform these clearance and settlement functions under agreements they have made with one another or with their customers. They are not obligated to perform or continue to perform these procedures and may modify them or discontinue them at any time.

Except as provided below, owners of beneficial interests in the Notes are not entitled to have the Notes registered in their names, will not receive or be entitled to receive physical delivery of the Notes in definitive form and will not be considered the owners or holders of the Notes under the Indenture, including for purposes of receiving any reports delivered by the Company or the Trustee pursuant to the Indenture. Accordingly, each person owning a beneficial interest in a Note must rely on the procedures of the depositary and, if such person is not a participant, on the procedures of the participant through which such person owns its interest, in order to exercise any rights of a holder of Notes.

Certificated Notes

If the depositary for any of the Notes represented by a registered global note is at any time unwilling or unable to continue as depositary or ceases to be a clearing agency registered under the Exchange Act, and a successor depositary registered as a clearing agency under the Exchange Act is not appointed by the Company within 90 days, the Company will issue Notes in definitive form in exchange for the registered global note that had been held by the depositary. Any Notes issued in definitive form in exchange for a registered global note will be registered in the name or names that the depositary gives to the Trustee or other relevant agent of the Trustee. It is expected that the depositary's instructions will be based upon directions received by the depositary from participants with respect to ownership of beneficial interests in the registered global note that had been held by the depositary. In addition, the Company may at any time determine that the Notes shall no longer be represented by a global note and will issue Notes in definitive form in exchange for such global note pursuant to the procedure described above.

Trustee, Paying Agents and Security Registrar

The Bank of New York Mellon Trust Company, N.A. is the trustee under the Indenture governing the Notes. The Bank of New York Mellon, London Branch, is the paying agent for the notes in London.

Base Indenture Provisions

Governing Law

The Notes and the Indenture are governed by the laws of the State of New York.

Consolidation, Merger and Sale of Assets

The Company may not merge or consolidate with any other entity or sell or convey all or substantially all of its assets to any person, firm, corporation or other entity, except that the Company may merge or consolidate with, or sell or convey all or substantially all of its assets to, any other entity if:

- the Company is the continuing entity or the successor entity (if other than us) is organized and existing under the laws of the United States of America, a State thereof or the District of Columbia and the successor entity expressly assumes payment of the principal of and interest on all the debt securities, and the performance and observance of all of the covenants and conditions of the Indenture to be performed by the Company; and
- there is no default under the Indenture.

Upon such a succession, the Company will be relieved from any further obligations under the applicable indenture. For purposes of this subsection, "substantially all of the Company's assets" means, at any date, a portion of the non-current assets reflected in the Company's consolidated balance sheet as of the end of the most recent quarterly period that represents at least 66 2/3% of the total reported value of such assets.

Events of Default

A holder of Notes will have special rights if an Event of Default occurs and is not cured. The term "Event of Default" means any of the following with respect to a series of Notes:

- the Company does not pay interest on a series of Notes within 30 days of the due date;
- the Company does not pay the principal of or premium, if any, on a series of Notes on the applicable due date;
- the Company does not pay any sinking fund installment on a series of Notes within 30 days of the due date;
- the Company remains in breach of any other covenant or warranty in Notes of such series or in the Indenture for 90 days after the Company receives a notice of default stating that the Company is in breach, as provided in the Indenture; or
- certain events of bankruptcy, insolvency or reorganization occur.

Remedies If an Event of Default Occurs.

If an Event of Default has occurred and continues with respect to a series of Notes, the Trustee or the holders of not less than 25% in principal amount of the Notes of the affected series may declare the entire principal amount of all of Notes of the affected series to be due and immediately payable. This is called a "declaration of acceleration of maturity." Under some circumstances, a declaration of acceleration of maturity may be canceled by the holders of at least a majority in principal amount of the Notes of that series.

The Trustee generally is not required to take any action under the Indenture at the request of any holders unless one or more of the holders has provided to the Trustee security or indemnity reasonably satisfactory to it.

If reasonable protection from expenses and liabilities is provided, the holders of a majority in principal amount of the outstanding Notes of the relevant series may direct the time, method and place of conducting any lawsuit or other formal legal action seeking any remedy available to the Trustee and to waive certain past defaults regarding the relevant series. The Trustee may refuse to follow those directions in some circumstances.

If an Event of Default occurs and is continuing regarding a series of Notes, the Trustee may use any sums that it holds under the Indenture for its own reasonable compensation and expenses incurred prior to paying the holders of Notes of that series.

Before any holder of any series of Notes may institute an action for any remedy, except payment on such holder's debt security when due, the holders of not less than 25% in principal amount of the Notes of that series outstanding must request the Trustee to take action. Holders must also offer and give the Trustee satisfactory security and indemnity against liabilities incurred by the Trustee for taking such action.

"Street Name" and other indirect holders should consult their banks or brokers for information on how to give notice or direction to or make a request of the Trustee and to make or cancel a declaration of acceleration.

The Company will furnish every year to the Trustee a written statement of certain of the Company's officers certifying that, to their knowledge, the Company is in compliance with the Indenture and the Notes, or else specifying any default.

No Event of Default regarding one series of Notes is necessarily an Event of Default regarding any other series of Notes.

Satisfaction and Discharge

The Indenture will be satisfied and discharged if:

- the Company delivers to the Trustee all debt securities then outstanding under the Indenture, including any Notes then outstanding, for cancellation; or
- all debt securities under the Indenture not delivered to the Trustee for cancellation, including any Notes then outstanding, have become due and payable, are to become due and payable within one year or are to be called for redemption within one year and the Company deposits an amount sufficient to pay the principal, premium, if any, and interest to the date of maturity, redemption or deposit (in the case of debt securities that have become due and payable), as the case may be, provided that in any case the Company has paid all other sums payable under the Indenture.

Defeasance and Covenant Defeasance

The Indenture provides that:

- the Company may elect either:
- to defease and be discharged from any and all obligations with respect to any Notes of such series (except for the obligations to register the transfer or exchange of such Notes, to replace temporary

or mutilated, destroyed, lost or stolen Notes, to maintain an office or agency in respect of the Notes and to hold moneys for payment in trust) ("defeasance"); or

- to be released from its obligations with respect to applicable restrictions under the Base Indenture; and
- the Events of Default described in the third, fourth and sixth bullets under "- Events of Default" above will not be Events of Default under the Indenture with respect to such series of Notes ("covenant defeasance"), upon the deposit with the Trustee (or other qualifying trustee), in trust for such purpose, of money or certain U.S. government obligations which through the payment of principal and interest in accordance with their terms will provide money, in an amount sufficient to pay the principal of (and premium, if any) and interest on such Notes, on the scheduled due dates.

In the case of defeasance, the holders of such Notes are entitled to receive payments in respect of such Notes solely from such trust. Such a trust may only be established if, among other things, the Company has delivered to the Trustee an opinion of counsel (as specified in the Indenture) to the effect that the holders of the Notes affected thereby will not recognize income, gain or loss for federal income tax purposes as a result of such defeasance or covenant defeasance and will be subject to federal income tax on the same amounts, in the same manner and at the same times as would have been the case if such defeasance or covenant defeasance had not occurred. Such opinion of counsel, in the case of defeasance described above, must refer to and be based upon a ruling of the Internal Revenue Service or a change in applicable federal income tax law occurring after the date of the Indenture.

Exhibit 10.25

GRANT NOTICE FOR
TIME-VESTED RESTRICTED STOCK UNIT AWARD

January 1, 2023

PPG Industries, Inc. (the "Company") and the Participant identified below are parties to a Restricted Stock Unit Award Agreement dated as of January 1, 2023 (the "Agreement"). Capitalized terms used in this Grant Notice shall have the respective meanings given to such terms in the Agreement, unless otherwise defined in this Grant Notice. This Grant Notice confirms the grant to the Participant of an Award of Restricted Stock Units with the terms set forth below. This Grant Notice is hereby incorporated by reference into and forms a part of the Agreement.

Participant Name:	Michael H. McGarry
Date of Grant:	January 1, 2023
Number of Restricted Stock Units Granted:	39,765
Dividend Equivalents:	"Dividend Equivalents" are not granted with respect to this Restricted Stock Unit Award. "Dividend Equivalents" means the right to receive the equivalent value (in cash or shares) of dividends paid on one share of Common Stock for each share that may be issued under an Award.
Vesting Date:	October 1, 2023, or, if earlier, the date, on or after July 1, 2023, upon which Participant retires from the Company.
Vesting Condition:	The Participant must be continuously employed by the Company or its Subsidiaries through the Vesting Date (as set forth above), subject to the provisions of the Agreement regarding retirement, disability, job elimination, death and other termination of employment.

PPG Industries, Inc.

By: /s/ K.R. Walling
Name: Kevin R. Walling
Title: Vice President and Chief Human Resources Officer

RESTRICTED STOCK UNIT AWARD AGREEMENT

January 1, 2023

This RESTRICTED STOCK UNIT AWARD AGREEMENT (this “Agreement”) is entered into as of the date first written above by and between PPG Industries, Inc. (the “Company”) and Michael H. McGarry (the “Participant”).

The Company maintains the PPG Industries, Inc. Omnibus Incentive Plan (as amended from time to time, the “Plan”), which is incorporated into and forms a part of this Agreement, and the Participant has been selected by the Human Capital Management and Compensation Committee or its designee (as applicable, the “Committee”) to receive an Award under the Plan. Capitalized terms used in this Agreement shall, unless defined elsewhere in this Agreement, have the respective meanings given to such terms in the Plan.

The Award of Restricted Stock Units shall be confirmed by a separate Grant Notice to which this Agreement is attached (the “Grant Notice”), specifying the Date of Grant of the Award, the number of Restricted Stock Units granted and the Vesting Condition (as defined in the Grant Notice) applicable to such Restricted Stock Units. Each Restricted Stock Unit is a bookkeeping entry representing the equivalent in value of a share of Common Stock. Such Award shall be subject to the terms and conditions of this Agreement and such Grant Notice shall be deemed incorporated by reference into this Agreement.

NOW, THEREFORE, the Company and the Participant, intending to be legally bound, agree as follows:

1. <u>Terms and Conditions of the Award</u>.

A. This Agreement sets forth the terms and conditions applicable to the Award of Restricted Stock Units confirmed in the Grant Notice. The Award of Restricted Stock Units is made under Article VII of the Plan. Unless and until the Restricted Stock Units are vested in the manner set forth in paragraph 1.F. and 2.A. hereof, the Participant shall have no right to settlement of any such Restricted Stock Units.

B. Prior to settlement of any vested Restricted Stock Units, such Restricted Stock Units will represent an unsecured obligation of the Company, payable (if at all) only from the general assets of the Company. The Company’s obligations under this Agreement shall be unfunded and unsecured, and no special or separate fund shall be established and no other segregation of assets shall be made and the Participant shall have no greater rights than an unsecured general creditor of the Company. Except as otherwise specifically provided in the Grant Notice or this Agreement, the Participant shall have no rights as a stockholder of the Company by virtue of any Restricted Stock Units granted under this Award unless and until such Award is determined to be vested and resulting shares of Common Stock are issued to the Participant.

C. If the Participant’s employment with the Company or any Employer terminates prior to the Vesting Date because of disability, job elimination (each as determined in the Committee’s sole discretion) or death, the Participant shall be entitled to the same Award to which the Participant would have been entitled had the Participant’s employment continued through the Vesting Date, and such Award shall be paid as soon as practicable following the Vesting Date, subject to paragraph 2.C. hereof.

D. If the Participant’s employment with the Company or any Employer terminates prior to the Vesting Date for any reason other than disability, job elimination or death, the Participant’s Award shall be forfeited on the date of such termination.

E. In the event that, during the Change in Control Period (as hereinafter defined), the Participant is subject to an Involuntary Termination (as hereinafter defined), then the Award shall become fully vested, and the payout of the Award shall be made as soon as practicable following the date of the

Involuntary Termination, subject to paragraph 2.C. hereof. The amount of any cash to be paid in lieu of Common Stock, if any, shall be determined using the closing sale price reported on the New York Stock Exchange-Composite Tape for the Common Stock on the date of Involuntary Termination, or if there is no sale on such date, for the nearest preceding date upon which such sale took place. The Company and the Participant shall take all steps necessary (including with regard to post-termination services by the Participant) to ensure that an Involuntary Termination constitutes a "separation from service" within the meaning of Section 409A of the Code, and notwithstanding anything contained herein to the contrary, the date on which a separation from service takes place for reasons resulting in an Involuntary Termination shall be the date of the Involuntary Termination.

If the Participant is a party to a Change in Control Employment Agreement with the Company (a "Change in Control Agreement"), "Change in Control Period" for purposes of this Agreement shall have the meaning ascribed to the term "Employment Period," as defined in the Change in Control Agreement, and if the Participant is not a party to a Change in Control Agreement, the term shall mean the period commencing on the date of a Change in Control (as defined in the Plan) and ending on the earlier of the Participant's date of Retirement and the Vesting Date. "Retirement" for purposes of this paragraph 1.G. shall mean the Executive's termination of employment on or after (i) with respect to a participant in a tax-qualified defined benefit pension plan sponsored by PPG, an Executive's "normal retirement date" as defined in such pension plan, (ii) with respect to any Executive that the Company may subject to compulsory retirement under the Age Discrimination in Employment Act (29 U.S.C. § 621 et. seq.) (ADEA) as a "bona fide executive or a high policy maker,", such Executive's "normal retirement date," (iii) with respect to a participant in the PPG Industries Defined Contribution Retirement Plan, the Executive's Social Security normal retirement date, provided that such termination is voluntary, or, (iv) with respect to a participant for whom the provisions in (i) through (iii) are not applicable, the Executive's attainment of age sixty-five (65), provided the termination is voluntary.

"Involuntary Termination" for purposes of this Agreement shall mean, if the Participant is a party to a Change in Control Agreement, a termination of the Participant's employment that gives rise to payments and benefits under Section 6 of the Change in Control Agreement, and if the Participant is not a party to a Change in Control Agreement, shall mean a termination by the Company for any reason other than Cause, death or Disability (as the terms are hereinafter defined). "Cause" for purposes of a Participant who is not a party to a Change in Control Agreement shall have the same meaning as that term is defined in the Participant's offer letter or other applicable employment agreement; or, if there is no such definition, "Cause" means, as determined by the Committee in good faith: (i) engaging in any act, or failing to act, or misconduct that is injurious to the Company or its Subsidiaries; (ii) gross negligence or willful misconduct in connection with the performance of duties; (iii) conviction of (or entering a plea of guilty or *nolo contendere* to) a criminal offense (other than a minor traffic offense); (iv) fraud, embezzlement or misappropriation of funds or property of the Company or a Subsidiary; (v) material breach of any term of any agreement between the Participant and the Company or a Subsidiary relating to employment, consulting or other services, confidentiality, intellectual property or non-competition; (vi) the entry of an order duly issued by any regulatory agency (including federal, state and local regulatory agencies and self-regulatory bodies) having jurisdiction over the Company or a Subsidiary requiring the removal from any office held by the Participant with the Company or prohibiting or materially limiting the Participant from participating in the business or affairs of the Company or any Subsidiary. "Disability" for purposes of this Agreement shall mean disability which, after the expiration of more than 52 weeks after its commencement, is determined to be total and permanent by a physician selected by the Company or its insurers.

2. Payout on Account of Awards.

A. Upon satisfaction of the Vesting Condition and all other applicable conditions as to the issuance of the Restricted Stock Units, and otherwise subject to this Agreement and the terms of the Plan, the Participant shall be entitled to the number of shares of Common Stock constituting the Award. The Participant shall be entitled to receive a payout of the vested Award in the form of cash, shares of

Common Stock or a combination of cash and shares, less any Tax-Related Items as defined in paragraph 7, as determined by the Committee in its sole discretion. The amount of any cash to be paid in lieu of Common Stock shall be determined on the basis of the Fair Market Value of the Common Stock as of the Vesting Date.

B. Any shares of Common Stock issued to the Participant with respect to his or her Award shall be subject to such restrictions as the Committee may deem advisable under the rules, regulations and other requirements of the Securities and Exchange Commission, the New York Stock Exchange and any applicable state or foreign securities laws, and the Committee may cause a legend or legends to be endorsed on any stock certificates for such shares making appropriate references to such legal restrictions.

C. Except as otherwise provided in this Agreement, the issuance of the shares of Common Stock in accordance with the provisions of paragraph 1 and this paragraph 2 will be delivered within 90 days following (i) the Vesting Date or (ii) to the extent applicable under the provisions of paragraph 1.G. hereof, the Involuntary Termination following a Change in Control.

3. Continuing Conditions. Notwithstanding any other provisions herein, the Participant, by execution of this Agreement, agrees and acknowledges that in return for the Award granted by the Company in this Agreement, the following continuing conditions shall apply:

A. If at any time prior to the Vesting Date or within one (1) year after the Vesting Date the Participant engages in any activity in competition with any activity of the Company or any of its Subsidiaries, or contrary or harmful to the interests of the Company or any of its Subsidiaries, including, but not limited to: (1) conduct related to the Participant's employment for which either criminal or civil penalties against the Participant may be sought; (2) violation of Company (or Subsidiary) Code of Ethics or similar policy; (3) accepting employment with or serving as a consultant, advisor or in any other capacity to an employer that is in competition with or acting against the interests of the Company or any of its Subsidiaries, including employing or recruiting any present, former or future employee of the Company or any of its Subsidiaries; (4) disclosing or misusing any confidential information or material concerning the Company or any of its Subsidiaries; or (5) participating in a hostile takeover attempt, then this Award shall terminate effective as of the date on which the Participant enters into such activity, unless terminated sooner by operation of another term or condition of this Agreement, and any "Award Gain" realized by the Participant shall be paid by the Participant to the Company. "Award Gain" shall mean the cash and the Fair Market Value of the Common Stock delivered to the Participant pursuant to paragraph 2 on the date of such delivery times the number of shares so delivered.

B. By accepting this Agreement, the Participant consents to a deduction from any amounts the Company or any of its Subsidiaries owes the Participant from time to time (including amounts owed the Participant as wages or other compensation, fringe benefits or vacation pay, as well as any other amounts owed to the Participant by the Company or any of its Subsidiaries), to the extent of the amounts payable to the Company by the Participant under paragraph 3.A. above. Whether or not the Company elects to make any set-off in whole or in part, if the Company does not recover by means of set-off the full amount payable by the Participant, calculated as set forth above, the Participant agrees to pay immediately the unpaid balance to the Company.

C. The Participant may be released from the Participant's obligations under paragraphs 3.A and 3.B above only if the Committee determines, in its sole discretion, that such action is in the best interest of the Company.

4. Award Subject to Plan Provisions. Unless otherwise expressly provided in the Grant Notice or this Agreement, the Restricted Stock Unit Award shall be subject to the provisions of the Plan, including, without limitation, Article XI. In the event of any conflict between this Agreement and either the Grant Notice or the Plan, the Grant Notice or Plan, as applicable, shall control over this Agreement.

5. Applicable Law; Entire Agreement; Venue. This Agreement shall be governed by and construed in accordance with the laws of the Commonwealth of Pennsylvania without reference to any choice of law principles. The Grant Notice, this Agreement and the Plan contain all terms and conditions with respect to the subject matter hereof.

For purposes of litigating any dispute that arises under the Award or this Agreement, the parties hereby submit to and consent to the jurisdiction of the Commonwealth of Pennsylvania, and agree that such litigation shall be conducted in the courts of Allegheny County, Pennsylvania, or other federal courts for the United States for the Western District of Pennsylvania, and no other courts, where this Award of Restricted Stock Units is made and/or to be performed. The parties agree that, if suit is filed in Allegheny County courts, application will be made by one or both parties, without objection, to have the case heard in the Center for Commercial and Complex Litigation of the Court of Common Pleas of Allegheny County.

6. Further Assurances. The Participant agrees, upon demand of the Company or the Committee, to do all acts and execute, deliver and perform all additional documents, instruments and agreements (including, without limitation, stock powers with respect to shares of Common Stock issued or otherwise distributed in relation to this Award) which may be reasonably required by the Company or the Committee, as the case may be, to implement the provisions and purposes of the Grant Notice, this Agreement and the Plan.

7. Taxes. Regardless of any action the Company and/or the Subsidiary employing the Participant (the “Employer”) take with respect to any or all income tax (including U.S. federal, state, and local tax and/or non-U.S. tax), social insurance, payroll tax, payment on account or other tax-related items related to the Participant’s participation in the Plan and legally applicable to the Participant or deemed by the Company or the Employer to be an appropriate charge to the Participant (“Tax-Related Items”), the Participant acknowledges that the ultimate liability for all Tax-Related Items is and remains the Participant’s responsibility and may exceed the amount, if any, actually withheld by the Company or the Employer. The Participant further acknowledges that the Company and/or the Employer (i) make no representations or undertakings regarding the treatment of any Tax-Related Items in connection with any aspect of the Award, including the grant and vesting of the Restricted Stock Units, the conversion of the Restricted Stock Units into shares or the receipt of an equivalent cash payment, the subsequent sale of any shares acquired pursuant to the Restricted Stock Units and the receipt of any dividends or Dividend Equivalents; and (ii) do not commit to and are under no obligation to structure the terms of the grant or any aspect of the Award to reduce or eliminate the Participant’s liability for Tax-Related Items or achieve any particular tax result. Further, if the Participant has become subject to tax in more than one jurisdiction, the Participant acknowledges that the Company and/or the Employer (or former employer, as applicable) may be required to withhold or account for Tax-Related Items in more than one jurisdiction.

Prior to any relevant taxable or tax withholding event, as applicable, the Participant shall pay or make adequate arrangements satisfactory to the Company and/or the Employer to satisfy all Tax-Related Items.

In this regard, the Participant authorizes the Company and/or the Employer, or their respective agents, to satisfy the Tax-Related Items obligation by or more of the following:

(i) withholding from the proceeds of the sale of shares of Common Stock acquired upon the vesting/settlement of the Award either through a voluntary sale or through a mandatory sale arranged by the Company (on the Participant’s behalf pursuant to this authorization); and /or

(ii) withholding from any wages or other cash compensation paid to the Participant by the Company and/or the Employer or from any equivalent cash payment received in connection with the Award; and /or

(iii) withholding in shares of Common Stock to be issued upon settlement of the Restricted Stock Units, provided, however that if the Participant is a Section 16 officer of the Company under the Exchange Act then the Company will withhold in shares of Common Stock upon the relevant taxable or tax withholding event, as applicable, unless the use of such withholding method is problematic under applicable tax or securities law or has materially adverse accounting consequences, in which case, the obligation for Tax-Related Items may be satisfied by one or a combination of methods (i) and (ii) above.

The Company may withhold or account for Tax-Related Items by considering applicable minimum statutory withholding amounts or other applicable withholding rates, including maximum applicable rates in the Participant's jurisdictions(s). In the event of over-withholding, the Participant may receive a refund of any over-withheld amount in cash and will have no entitlement to the equivalent in Common Stock or if not refunded, the Participant may seek a refund from the local tax authorities. In the event of under-withholding, the Participant may be required to pay any additional Tax-Related Items directly to the applicable tax authority or to the Company and/or the Employer. If the obligation for Tax-Related Items is satisfied by withholding a number of shares as described herein, the Participant shall be deemed, for tax purposes only, to have been issued the full number of shares of Common Stock subject to the vested portion of the Award, notwithstanding that a number of shares are held back solely for the purpose of paying the Tax-Related Items due as a result of any aspect of the Award. The Participant shall pay to the Company and/or the Employer any amount of Tax-Related Items that is required to be withheld or accounted for in connection with the Restricted Stock Units that cannot be satisfied by the means previously described. The Company may refuse to deliver to the Participant any shares of Common Stock pursuant to the Award if the Participant fails to comply with his or her obligations in connection with the Tax-Related Items.

Anything in this paragraph 7 to the contrary notwithstanding, the number of shares of Common Stock subject to Restricted Stock Units that will be permitted to be released and withheld (or sold on the Participant's behalf) to satisfy any Tax-Related Items arising prior to the date the shares are scheduled to be delivered pursuant to paragraph 2.C. hereof for any portion of the Restricted Stock Units that are considered nonqualified deferred compensation subject to Section 409A of the Code shall not exceed the number of shares of Common Stock that equals the liability for the Tax-Related Items.

8. Transfer Restrictions. This Award and the Restricted Stock Units are not transferable other than by will or the laws of descent and distribution, and may not be assigned, hypothecated or otherwise pledged and shall not be subject to execution, attachment or similar process. Upon any attempt to effect any such disposition, or upon the levy of any such process, the Award shall immediately become null and void and the Restricted Stock Units shall be forfeited.

9. Capitalization Adjustments. The number of Restricted Stock Units awarded is subject to adjustment as provided in Section 11.07(a) of the Plan. The Participant shall be notified of such adjustment and such adjustment shall be binding upon the Company and the Participant.

10. Securities Law Compliance. Notwithstanding anything to the contrary contained herein, no shares of Common Stock shall be issued to the Participant upon vesting of this Restricted Stock Unit Award unless the Common Stock is then registered under the U.S. Securities Act of 1933, as amended (the "Securities Act"), or, if such Common Stock is not then so registered, the Company has determined that such vesting and issuance would be exempt from the registration requirements of the Securities Act. By accepting this Award, the Participant agrees not to sell any of the shares of Common Stock received under this Award at a time when the applicable laws or Company policies prohibit a sale.

11. Award Confers No Rights to Continued Employment. Nothing contained in the Plan or this Agreement shall give the Participant the right to be retained in the employment of the Company or any Subsidiary or affect the right of any such employer to terminate the Participant's employment.

12. Severability. If any provision of this Agreement shall be held to be illegal, invalid or unenforceable, that provision will be enforced to the maximum extent permissible and the legality, validity and enforceability of the remaining provisions shall not in any way be affected or impaired thereby.

13. Waiver. The Participant acknowledges that a waiver by the Company of breach of any provision of this Agreement shall not operate or be construed as a waiver of any other provision of this Agreement, or of any subsequent breach of this Agreement.

14. Electronic Delivery and Acceptance. The Company may, in its sole discretion, decide to deliver any documents related to current or future participation in the Plan by electronic means or request the Participant's consent to participate in the Plan by electronic means. The Participant hereby consents to receive such documents by electronic delivery and agrees to participate in the Plan through an on-line or electronic system established and maintained by the Company or a third party designated by the Company.

15. Code Section 409A. If the Participant is a "specified employee," within the meaning of Section 409A of the Code and the U.S. Treasury Regulations promulgated thereunder (collectively, "Section 409A"), at the time of a separation from service, any payments made under this Agreement in connection with a separation from service shall instead be paid on the first business day following the expiration of the six(6)-month period following the Participant's separation from service if necessary to comply with Section 409A.

It is the intent that the Restricted Stock Units shall comply with the requirements of Section 409A, and any ambiguities herein will be interpreted to so comply. The Company reserves the right, to the extent the Company deems necessary or advisable in its sole discretion, to unilaterally amend or modify this Agreement as may be necessary to ensure that all vesting or payouts provided under this Agreement are made in a manner that complies with Section 409A or to mitigate any additional tax, interest and/or penalties or other adverse tax consequences that may apply under Section 409A if compliance is not practical; provided, however, that nothing in this paragraph 15 creates an obligation on the part of the Company to modify the terms of this Agreement or the Plan, and the Company makes no representation that the terms of the Restricted Stock Units will comply with Section 409A or that payments under the Restricted Stock Units will not be subject to taxes, interest and penalties or other adverse tax consequences under Section 409A. In no event whatsoever shall the Company or any of its Subsidiaries or affiliates be liable to any party for any additional tax, interest or penalties that may be imposed on the Participant by Section 409A or any damages for failing to comply with Section 409A.

16. Imposition of Other Requirements. The Company reserves the right to impose other requirements on the Participant's participation in the Plan, on the Restricted Stock Units and on any shares of Common Stock acquired under the Plan, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require the Participant to sign any additional agreements or undertakings that may be necessary to accomplish the foregoing.

PPG Industries, Inc.

/s/ K.R. Walling

By: Kevin R. Walling, Vice President and Chief Human Resources Officer

Exhibit 13.1

PPG INDUSTRIES, INC. AND CONSOLIDATED SUBSIDIARIES
Market Information, Dividends, Holders of Common Stock and Stock Performance Graph
For the Year Ended December 31, 2022

Market Information

PPG common stock is traded on the New York Stock Exchange (symbol: PPG).

Quarterly Stock Market Price

	2022		2021	
Quarter Ended	**High**	**Low**	**High**	**Low**
March 31	$177.32	$111.32	$156.57	$132.10
June 30	$138.10	$107.06	$182.97	$146.73
September 30	$137.93	$109.78	$172.52	$143.00
December 31	$137.72	$107.40	$172.98	$141.81

Dividends

$ in millions, except per share data	2022		2021	
Month of Payment	**$**	**Per Share**	**$**	**Per Share**
March	$139	$0.59	$128	$0.54
June	140	0.59	128	0.54
September	145	0.62	140	0.59
December	146	0.62	140	0.59
Total	$570	$2.42	$536	$2.26

PPG has paid uninterrupted annual dividends since 1899. The latest quarterly dividend of 62 cents per share was approved by the board of directors on January 19, 2023, payable March 10, 2023 to shareholders of record February 17, 2023.

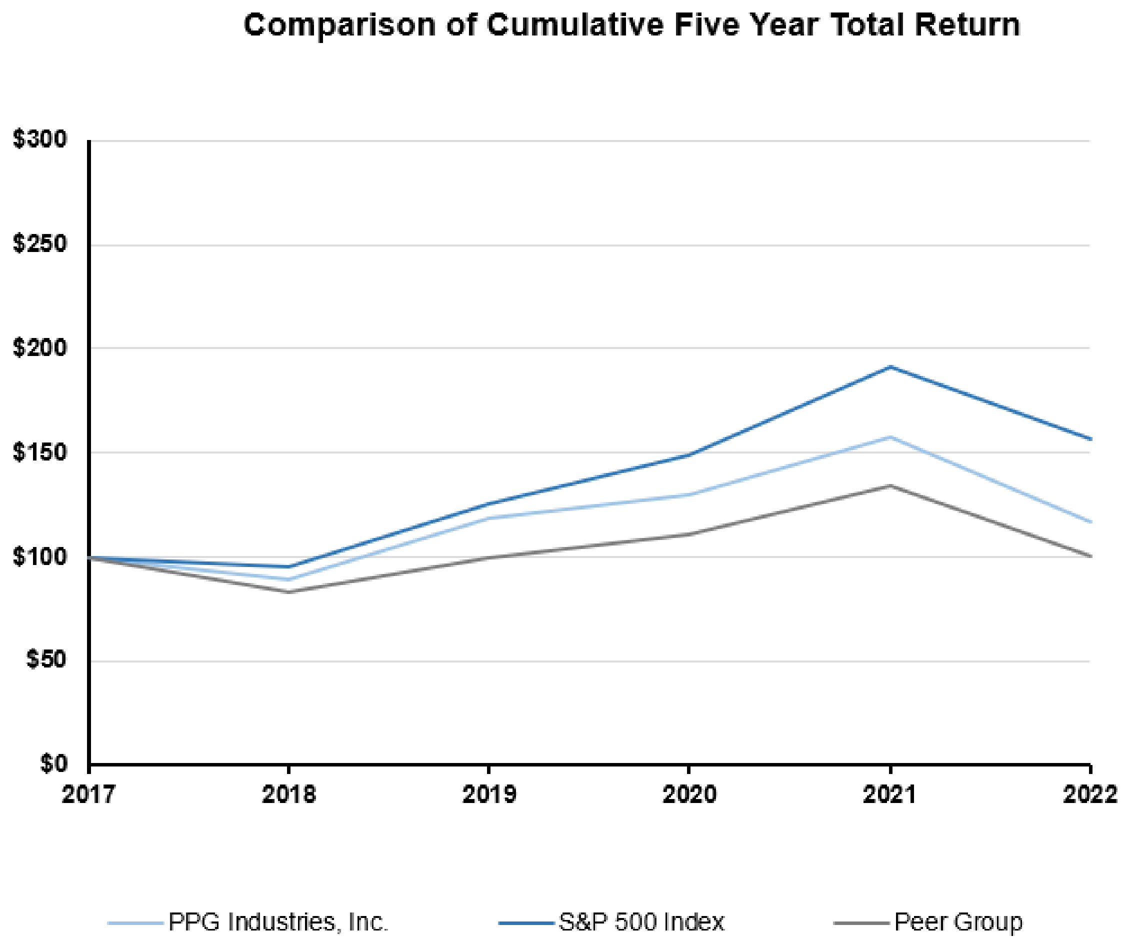
Holders of Common Stock

The number of holders of record of PPG common stock as of January 31, 2023 was 13,173 as shown on the records of the Company's transfer agent.

Stock Performance Graph

The following graph compares the yearly percentage changes in the cumulative total shareholder value return of the company's common stock with the cumulative total return of the Standard & Poor's Composite 500 Stock Index ("S&P 500") and a defined Peer Group, for the five-year period beginning December 31, 2017 and ending December 31, 2022. This graph assumes that the investment in the company's common stock and each index was $100 on December 31, 2017 and that all dividends were reinvested.

The Peer Group includes 3M Co., Akzo Nobel N.V., Axalta Coatings Systems Ltd., Dow, Inc., Dupont de Nemours, Inc., Eastman Chemical Co., Masco Corp., RPM International Inc., and The Sherwin-Williams Co.



The following table summarizes stock performance graph data points in dollars:

	December 31,					
	2017	2018	2019	2020	2021	2022
PPG	$100	$89	$118	$130	$158	$117
S&P 500	$100	$96	$126	$149	$191	$157
Peer Group	$100	$84	$99	$111	$134	$101

PPG Industries, Inc.
And Consolidated Subsidiaries

Subsidiaries of the Registrant
December 31, 2022

Significant subsidiaries included in the 2022 consolidated financial statements of the Company are:

United States:	Jurisdiction of Incorporation or Organization	Percentage of Voting Power
AIPCF V Texstars Blocker Inc.	Delaware	100
Alpha Coating Technologies, LLC	Illinois	100
Alpha Coatings, Inc.	Ohio	100
Cuming Microwave Corporation	Massachusetts	100
Dexmet Corporation	Delaware	100
Dexmet Holding Corporation	Delaware	100
Ennis Canadian Holding Company	Texas	100
Ennis Paint Netherlands Holdings, LLC	Texas	100
Ennis-Flint, Inc.	North Carolina	100
Metokote Corporation	Delaware	100
Metokote Mexico Holdings, Inc.	Ohio	100
Polymeric Systems, Inc.	Delaware	100
PPG Architectural Finishes, Inc.	Delaware	100
PPG Holdings Argentina USA LLC	Delaware	100
PPG Holdings Latin America USA LLC	Delaware	100
PPG Industries International, Inc.	Delaware	100
PPG Industries Ohio, Inc.	Delaware	100
PPG Industries Securities, LLC	Delaware	100
PPG Kansai Automotive Finishes U.S., LLC	Delaware	60
PRC-Desoto International, Inc.	California	100
Road Infrastructure Investment Holdings, Inc.	Delaware	100
SEM Products, Inc.	North Carolina	100
Sierracin Corporation	Delaware	100
Sierracin/Sylmar Corporation	California	100
Texstars, LLC	Delaware	100
The Crown Group Co.	Michigan	100
Traffic Safety Parent LLC	Delaware	100
Whitford Corporation	Pennsylvania	100
Whitford Worldwide Company, LLC	Delaware	100
Other Americas:		
Comercial Mexicana de Pinturas, S.A. de C.V.	Mexico	100
Comex Industrial Coatings, S.A. de C.V.	Mexico	100
Consorcio Comex, S.A. de C.V.	Mexico	100
Cristacol S.A.	Argentina	100
Distribuidora Kroma, S.A. de C.V.	Mexico	100
Empresa Aga, S.A. de C.V.	Mexico	100
Ennis Paint Canada ULC	Alberta	100
Fpu Industrial, S.A. de C.V.	Mexico	100
Grupo Comex, S.A. de C.V.	Mexico	100

	Metokote Canada ULC	Canada	100
	Metokote de Mexico S. de RL de CV	Mexico	100
	Plásticos Envolventes, S.A. de C.V.	Mexico	100
	PPG ALESCO Automotive Finishes Mexico, S. de R.L. de C.V.	Mexico	60
	PPG A P Resinas, S.A. de C.V.	Mexico	100
	PPG Architectural Coatings (Puerto Rico) Inc.	Puerto Rico	100
	PPG Architectural Coatings Canada Inc./PPG Revêtements Architecturaux Canada Inc.	Canada	100
	PPG Business Services, S.A. de C.V.	Mexico	100
	PPG Canada Inc.	Canada	100
	PPG Industrial do Brasil - Tintas E. Vernizes - Ltda.	Brazil	100
	PPG Industries Argentina S.R.L.	Argentina	100
	PPG Industries Colombia Ltda.	Colombia	100
	PPG Industries de Mexico, S.A. de C.V.	Mexico	100
	PPG Kansai Automotive Finishes Canada, LP	Canada	60
	Viasa, S.A. de C.V.	Mexico	100
EMEA:			
	AS Tikkurila	Estonia	100
	Chorlton Trade Paints Limited	United Kingdom	100
	Ennis Paint U.K. Holding Company Limited	England and Wales	100
	EPIC Insurance Co. Ltd.	Bermuda	100
	Industria Chimica Reggiana I.C.R. SPA	Italy	100
	Johnstone’s Paints Limited	United Kingdom	100
	Kalon Investment Company Limited	United Kingdom	100
	Kalon South Africa Proprietary Limited	South Africa	100
	Karl Worwag Lack-und Farbenfabrik GmbH & Co. KG	Germany	100
	Metokote UK Limited	United Kingdom	100
	OOO Tikkurila	Russia	100
	Peintures de Paris SAS	France	99.94
	PPG AC - France SA	France	99.94
	PPG Architectural Coatings Ireland Limited	Ireland	100
	PPG Architectural Coatings Italy S.r.l.	Italy	100
	PPG Architectural Coatings UK Limited	United Kingdom	100
	PPG Cetelon Lackfabrik GmbH	Germany	100
	PPG Cieszyn S.A.	Poland	100
	PPG Coatings B.V.	The Netherlands	100
	PPG Coatings Belgium BV	Belgium	100
	PPG Coatings Danmark A/S	Denmark	100
	PPG Coatings Deutschland GmbH	Germany	100
	PPG Coatings Europe B.V.	The Netherlands	100
	PPG Coatings Nederland BV	The Netherlands	100
	PPG Coatings S.A.	France	99.9
	PPG Coatings South Africa (Pty) Ltd.	South Africa	100
	PPG Deco Czech a.s.	Czech Republic	100
	PPG Deco Polska sp. z.o.o.	Poland	100
	PPG Deco Slovakia, s.r.o.	Slovakia	100
	PPG Deutschland Business Support GmbH	Germany	100
	PPG Deutschland Sales & Services GmbH	Germany	100
	PPG Distribution S.A.S.	France	99.94

PPG DYRUP, S.A.	Portugal	100
PPG Europe B.V.	The Netherlands	100
PPG Finance B.V.	The Netherlands	100
PPG Finland Oy	Finland	100
PPG France Business Support S.A.S.	France	100
PPG France Manufacturing S.A.S.	France	100
PPG Guadeloupe SAS	Guadeloupe	100
PPG Hemmelrath Lackfabrik GmbH	Germany	100
PPG Holdco SAS	France	100
PPG Holdings (U.K.) Limited	United Kingdom	100
PPG Ibérica Sales & Services, S.L.	Spain	100
PPG Ibérica, S.A.	Spain	100
PPG Industrial Coatings B.V.	The Netherlands	100
PPG Industries (UK) Ltd	United Kingdom	100
PPG Industries Czech Republic, s.r.o.	Czechia	100
PPG Industries Delfzijl B.V.	The Netherlands	100
PPG Industries Europe Sàrl	Switzerland	100
PPG Industries France S.A.S.	France	100
PPG Industries Italia S.r.l.	Italy	100
PPG Industries Kimya a Sanayi VE Ticaret AS	Turkey	100
PPG Industries Lackfabrik GmbH	Germany	100
PPG Industries Middle East FZE	U.A.E.	100
PPG Industries Netherlands B.V.	The Netherlands	100
PPG Industries Poland Sp. Z.o.o.	Poland	100
PPG Italia Business Support S.r.l.	Italy	100
PPG Italia Sales & Services S.r.l.	Italy	100
PPG Kansai Automotive Finishes U.K. LLP	United Kingdom	60
PPG Luxembourg Finance S.àR.L.	Luxembourg	100
PPG Luxembourg Holdings S.àR.L.	Luxembourg	100
PPG Refinish Distribution Limited	United Kingdom	100
PPG Réunion SAS	La Reunion	51
PPG Romania S.A.	Romania	100
PPG Switzerland GmbH	Switzerland	100
PPG Trilak Korlátolt FelelősségüTárasaság (PPG Trilak Kft.)	Hungary	100
PPG Worwag International Gmbh	Germany	100
ProCoatings B.V.	The Netherlands	100
Revocoat France SAS	France	100
Revocoat Holding SAS	France	100
Revocoat Iberica SLU	Spain	100
Sealants Europe SAS	France	100
Sigma Marine & Protective Coatings Holding B.V.	The Netherlands	100
SigmaKalon (BC) UK Limited	United Kingdom	100
Tikkurila Norge A/S	Norway	100
Tikkurila Oyj	Finland	100
Tikkurila Polska S.A.	Poland	100
Tikkurila Sverige AB	Sweden	100
TOO Tikkurila	Kazakhstan	100
Vernisol, S.p.A.	Italy	100
Whitford B.V.	The Netherlands	100

Whitford Ltd. (UK)	United Kingdom	100
Whitford S.r.l.	Italy	100
Asia:		
Broad Range Development Limited	Hong Kong	100
Ennis Traffic Safety Solutions Pty Ltd.	Australia	100
Foshan Bairun Chemicals Co., Ltd.	China	100
Hemmelrath Automotive Coatings (Jilin) Co., Ltd.	China	100
Hemmelrath International Trade (Shanghai) Co., Ltd.	China	100
Huangshan Huajia Surface Technology Co., Ltd.	China	100
PPG Aerospace Materials (Suzhou) Co. Ltd.	China	100
PPG Asian Paints Private Ltd.	India	50
PPG Coatings (Hong Kong) Co., Limited	Hong Kong	100
PPG Coatings (Kunshan) Co., Ltd.	China	100
PPG Coatings (Malaysia) Sdn. Bhd.	Malaysia	100
PPG Coatings (Shanghai) Co., Ltd.	China	100
PPG Coatings (Thailand) Co., Ltd.	Thailand	100
PPG Coatings (Tianjin) Co., Ltd.	China	100
PPG Coatings (Wuhu) Company, Ltd.	China	100
PPG Coatings (Zhangjiagang) Co., Ltd.	China	100
PPG COATINGS SINGAPORE PTE. LTD.	Singapore	100
PPG Industries (Korea) Ltd.	Korea, Republic Of	100
PPG Industries (Singapore) Pte., Ltd.	Singapore	100
PPG Industries Australia PTY Limited A.C.N. 055 500 939	Australia	100
PPG Industries New Zealand Limited	New Zealand	100
PPG Investment (Singapore) Pte. Ltd.	Singapore	100
PPG Japan Ltd.	Japan	100
PPG Management (Shanghai) Co., Ltd.	China	100
PPG Packaging Coatings (Suzhou) Co., Ltd.	China	100
PPG Paints Trading (Shanghai) Co., Ltd.	China	100
PPG Performance Coatings (Hong Kong) Limited	Hong Kong	100
PPG Powder Coatings (Shanghai) Co., Ltd.	China	100
PPG SSC Co., Ltd.	South Korea	80.01
PPG Vietnam Co., Ltd.	Vietnam	100
PRC-DeSoto Australia Pty Ltd.	Australia	100
Protec Pty Ltd.	Australia	100
PT. PPG Coatings Indonesia	Indonesia	100
Sikar (Shanghai) Trading Co. Ltd.	China	100
Tikkurila (China) Paints Co., Ltd.	China	100
Whitford Jiangmen Ltd.	China	100
Whitford Ltd. (HK)	Hong Kong	100
Whitford Pte. Ltd.	Singapore	100
Worwag Coatings (Langfang) Co. Ltd.	China	100

Exhibit 23

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statement on Form S-3 No. 333-266369 and Registration Statements on Form S-8 Nos. 333-258227, 333-258226, 333-258225, 333-173656, 333-173657, 333-173658, 333-176852, 333-192988, 333-212813, and 333-217448, of PPG Industries, Inc. of our report dated February 16, 2023 relating to the financial statements, financial statement schedule and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
Pittsburgh, Pennsylvania
February 16, 2023

Exhibit 24

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Stephen F. Angel, a Director of PPG Industries, Inc. (the “Corporation”), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation’s Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ STEPHEN F. ANGEL

Stephen F. Angel

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Hugh Grant, a Director of PPG Industries, Inc. (the “Corporation”), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation’s Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ HUGH GRANT

Hugh Grant

PPG INDUSTRIES, INC.

<u>POWER OF ATTORNEY</u>

(10-K)

I, Melanie L. Healey, a Director of PPG Industries, Inc. (the “Corporation”), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation’s Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ MELANIE L. HEALEY

Melanie L. Healey

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Gary R. Heminger, a Director of PPG Industries, Inc. (the "Corporation"), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation's Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ GARY R. HEMINGER

Gary R. Heminger

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Michael W. Lamach, a Director of PPG Industries, Inc. (the "Corporation"), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation's Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ MICHAEL W. LAMACH

Michael W. Lamach

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Kathleen A. Ligocki, a Director of PPG Industries, Inc. (the “Corporation”), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation’s Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ KATHLEEN A. LIGOCKI

Kathleen A. Ligocki

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Michael H. McGarry, a Director of PPG Industries, Inc. (the “Corporation”), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation’s Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ MICHAEL H. MCGARRY

Michael H. McGarry

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Michael T. Nally, a Director of PPG Industries, Inc. (the “Corporation”), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation’s Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ MICHAEL T. NALLY

Michael T. Nally

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Guillermo Novo, a Director of PPG Industries, Inc. (the “Corporation”), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation’s Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ GUILLERMO NOVO

Guillermo Novo

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Martin H. Richenhagen, a Director of PPG Industries, Inc. (the “Corporation”), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation’s Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ MARTIN H. RICHENHAGEN

Martin H. Richenhagen

PPG INDUSTRIES, INC.

POWER OF ATTORNEY

(10-K)

I, Catherine R. Smith, a Director of PPG Industries, Inc. (the “Corporation”), a Pennsylvania corporation, hereby constitute and appoint Timothy M. Knavish, Anne M. Foulkes and Vincent J. Morales, or any of them, my true and lawful attorneys or attorneys-in-fact, with full power of substitution and revocation, to sign, in my name and on my behalf as a Director of the Corporation, the Corporation’s Form 10-K for the fiscal year ended December 31, 2022, to be filed with the Securities and Exchange Commission, Washington, DC.

WITNESS my hand this 16th day of February, 2023.

/s/ CATHERINE R. SMITH

Catherine R. Smith

Exhibit 31.1

PRINCIPAL EXECUTIVE OFFICER CERTIFICATION

I, Timothy M. Knavish, certify that:

1. I have reviewed this annual report on Form 10-K of PPG Industries, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant’s other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    c) Evaluated the effectiveness of the registrant’s disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    d) Disclosed in this report any change in the registrant’s internal control over financial reporting that occurred during the registrant’s most recent fiscal quarter (the registrant’s fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant’s internal control over financial reporting; and

5. The registrant’s other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant’s auditors and the audit committee of the registrant’s board of directors (or persons performing the equivalent functions):

    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant’s ability to record, process, summarize and report financial information; and

    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant’s internal control over financial reporting.

Date: February 16, 2023

/s/ Timothy M. Knavish

Timothy M. Knavish
Director, President and Chief Executive Officer

Exhibit 31.2

PRINCIPAL FINANCIAL OFFICER CERTIFICATION

I, Vincent J. Morales, certify that:

1. I have reviewed this annual report on Form 10-K of PPG Industries, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

    c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

    d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 16, 2023

/s/ Vincent J. Morales

Vincent J. Morales
Senior Vice President and Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the annual report on Form 10-K of PPG Industries, Inc. for the period ended December 31, 2022 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Timothy M. Knavish, Director, President and Chief Executive Officer of PPG Industries, Inc., certify to the best of my knowledge, pursuant to 18 U.S.C. §1350, as adopted pursuant to §906 of the Sarbanes-Oxley Act of 2002, that:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of PPG Industries, Inc.

/s/ Timothy M. Knavish

Timothy M. Knavish
Director, President and Chief Executive Officer
February 16, 2023

A signed original of this written statement required by Section 906 has been provided to PPG Industries, Inc. and will be retained by PPG Industries, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.

Exhibit 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the annual report on Form 10-K of PPG Industries, Inc. for the period ended December 31, 2022 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Vincent J. Morales, Senior Vice President and Chief Financial Officer of PPG Industries, Inc., certify to the best of my knowledge, pursuant to 18 U.S.C. §1350, as adopted pursuant to §906 of the Sarbanes-Oxley Act of 2002, that:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of PPG Industries, Inc.

/s/ Vincent J. Morales

Vincent J. Morales
Senior Vice President and Chief Financial Officer
(Principal Financial Officer)

February 16, 2023

A signed original of this written statement required by Section 906 has been provided to PPG Industries, Inc. and will be retained by PPG Industries, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.