TRINSEO PLC
Directors' Report and Financial Statements
For the Year Ended December 31, 2022

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DIRECTORS' REPORT
For the Year Ended December 31, 2022

Principal Activities

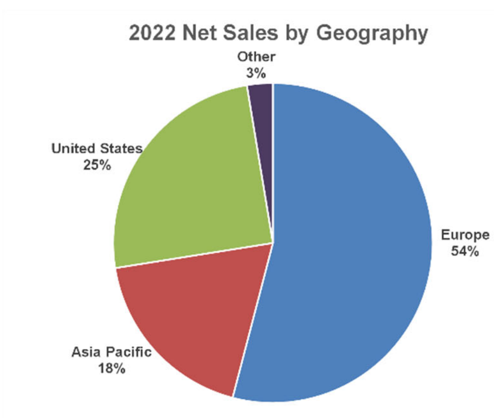
Unless otherwise indicated or required by context, references throughout to the "Group," "we," "us" and "our" refer to Trinseo and its consolidated subsidiaries, taken as a consolidated entity.

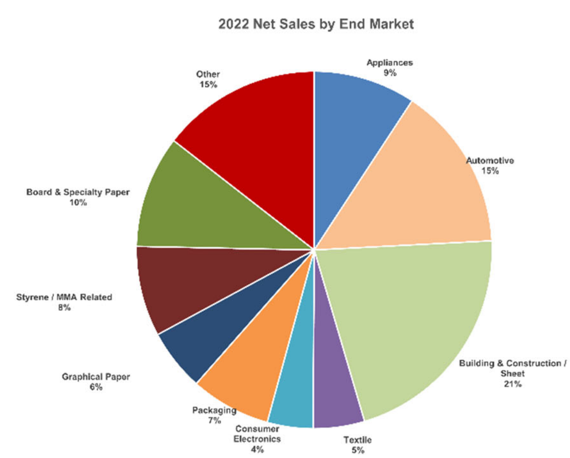
Trinseo PLC (NYSE: TSE) is a public limited company existing under the laws of Ireland. On October 8, 2021, our former publicly-traded parent entity, Trinseo S.A., was merged with and into Trinseo PLC, with Trinseo PLC as the surviving entity. As a result of the merger, all of Trinseo S.A.'s outstanding ordinary shares, excluding treasury shares, were exchanged on a one-for-one basis for newly issued ordinary shares of Trinseo PLC.

Prior to the formation of Trinseo S.A., our business was wholly owned by The Dow Chemical Company, which, together with its affiliates, we refer to as "Dow," and we refer to our predecessor business as "the Styron business." In 2010, the Styron business was sold by Dow to investment funds advised or managed by affiliates of Bain Capital Partners, LP (the "Dow Separation") and Trinseo S.A. was formed and subsequently began trading on the NYSE in June 2014. In 2016, Bain Capital fully divested its ownership in the Group.

We are a specialty material solutions provider with a focus on partnering with companies to bring ideas to life in an imaginative, smart, and sustainability-focused manner. We have leading market positions in many of the markets in which we compete. Our products are incorporated into a wide range of our customers' products throughout the world, including products for automotive applications, consumer electronics, appliances, medical devices, packaging, footwear, carpet, paper and board, building and construction, and wellness, among others. We have long-standing relationships with a diverse base of global customers, many of whom are leaders in their markets and rely on us for formulation, technological differentiation, and compounding expertise to find sustainable solutions for their businesses. Many of our products represent only a small portion of a finished product's manufacturing costs, but provide critical functionality to the finished product and are often specifically developed to customer specifications. Therefore, we seek to regularly develop new and improved products and processes, supported by our intellectual property portfolio and manufacturing know-how, designed to enhance our customers' product offerings. We believe these product traits result in substantial customer loyalty.

We have significant manufacturing and production operations around the world, which allow us to serve our global customer base. As of December 31, 2022, our production facilities included 39 manufacturing plants and one recycling facility at 33 sites across 15 countries, including the Group's joint venture. Additionally, as of December 31, 2022, we operated 11 research and development ("R&D") facilities globally, including technology and innovation development centers, which we believe are critical to our global presence and innovation capabilities. Our significant global operations also provide diversity in the end markets for our products.





Our Strategy

In 2022, we continued to focus our efforts and investments on a strategy to transform Trinseo into a specialty materials and sustainable solutions provider focusing on product offerings which are less cyclical and offer significantly higher growth and margin potential. In pursuit of this transformational goal, we have invested, and will continue to invest, in product offerings serving the applications within our Engineered Materials business segment, as well as coatings, adhesives, sealants, and elastomers (“CASE”) applications within the Latex Binders business segment.

In furtherance of this strategy and to improve our footprint as a sustainable solutions provider, in January 2022, we completed the acquisition of Heathland B.V. (“Heathland”) for an estimated purchase price of $29.3 million, including an initial cash purchase price of $22.9 million, as well as $6.4 million of contingent cash consideration, representing the fair value of certain earn-out payments (the “Heathland Acquisition”). Heathland is based in Utrecht, the Netherlands, and is focused on converting post-consumer and post-industrial polymethyl methacrylates (“PMMA”), polycarbonate (“PC”), acrylonitrile-butadiene-styrene (“ABS”), polystyrene, and other thermoplastic waste for use in a wide range of high-end applications. In January 2022, we began a formal process for the divestiture of our styrenics businesses, which includes our Feedstocks, Polystyrene, and Americas Styrenics reporting segments. While this process generated broad and significant interest from both strategic and financial parties, the deterioration of financing markets and the economic uncertainty created by the war in Ukraine, particularly in European energy markets, impeded our ability to obtain full value for the styrenics businesses. As a result in July 2022, we announced our decision to pause the sale process, and our intention to reevaluate a potential sale of the styrenics business when macroeconomic conditions improve. The styrenics business separation remains an integral part of our transformation strategy, and we continue to evaluate actions to transform the Group into a higher growth, higher margin and less cyclical specialty and sustainable materials provider.

We believe that there are still significant opportunities to improve our business and enhance our position as a specialty materials and sustainable solutions provider by continuing to enhance our existing portfolio, and by expanding on businesses we have acquired. In addition to our transformation strategy, the Group continues to seek organic growth through expansion into key markets or strategic capital investments targeting technologies and solutions that meet the evolving needs of our customers, and to continue to provide innovative products to our customers who seek our technological and development capabilities to create specialty grades, new and sustainable products, and technologically-differentiated formulations. The Group will continue to focus on growing margins and reducing earnings volatility through such organic investments, strategic acquisitions or investments, as well as divestitures of businesses less suitable to our portfolio. The strategic acquisitions and investments that we have pursued have attractive risk-adjusted returns in markets and geographies that we believe have the best opportunity for growth as well as opportunity for cost-saving synergies. In addition, in December 2022, we implemented an asset restructuring initiative designed to reduce costs, improve profitability, reduce our exposure to cyclical markets and strengthen our competitive position through the closure of certain underperforming or uncompetitive plants and product lines.

We remain committed to maintaining a strong financial position with appropriate financial flexibility and liquidity. The Group employs a disciplined approach to capital allocation and deployment of cash that strives to balance the growth of our business, funding for targeted acquisitions, and continued cash generation, while providing attractive returns to our shareholders. For 2022, this included distributing a quarterly dividend to shareholders of $0.32 per share and repurchasing a total value of $150.0 million of our ordinary shares, which completed the share repurchase program authorized in December 2021. Further, in September 2022, the Group’s board of directors authorized a $200.0 million share repurchase program covering an 18-month period. There were no repurchases under this share repurchase program in 2022.

The priorities for uses of available cash include the servicing of our debt, the funding of targeted growth initiatives, and the continued return of capital to our shareholders via quarterly dividends and the repurchase of our ordinary shares, when deemed appropriate. Management believes that strong cash flow generation, continued profitability, and spending discipline are critical to providing the Group with the ongoing flexibility to pursue our business strategy.

For more information regarding our strategic highlights see *2022 Highlights*.

Business Segments

The Group operates under six reporting segments: Engineered Materials, Latex Binders, Base Plastics, Polystyrene, Feedstocks, and Americas Styrenics. Our reporting segments reflect the model under which the business is being managed and results are being reviewed by the Chief Executive Officer, who is the Group's chief operating decision maker.

For information regarding net sales, Adjusted EBITDA, the performance metric used by management to evaluate our segments' performance, and capital expenditures by segment, as well as sales and long-lived assets by geographic area, refer to Note 20 in the consolidated financial statements.

Engineered Materials Segment

Overview

Our Engineered Materials segment consists of rigid thermoplastic compounds and blends products, soft thermoplastic products, continuous cast, cell cast and extruded PMMA sheet products, and PMMA resins. Products in this segment are primarily targeted toward higher growth and higher margin applications primarily in consumer electronics, medical, footwear, automotive and building & construction. The PMMA business also includes production of activated methyl methacrylates ("MMA") in Europe primarily for our own consumption in producing PMMA with the remainder sold into the merchant market. Our MMA production process yields ammonium sulfate as a byproduct which is sold into the market.

In 2022, approximately 35% of total Engineered Materials net sales were generated in Europe, approximately 50% were generated in the United States, and approximately 14% were generated in Asia.

Products and End Uses

Products in the Engineered Materials segment are split into rigid compounds, soft plastic compounds, and PMMA resins and sheets. Rigid compounds include PC compounds, ABS compounds, and PC blends, mostly PC/ABS, and support primarily the consumer electronics and medical markets for equipment housing applications. Thermoplastic elastomer ("TPE") soft plastic compounds are focused on supporting footwear shoe sole applications, personal care, consumer electronics, and automotive high-end applications such as overmolds, sealings, tubing, and films. PMMA products can be sold as resin compounds or sheets produced through continuous-cast, extrusion, and cell-cast processes. PMMA products are sold primarily into building & construction, automotive, medical and consumer goods applications.

The benefit of Trinseo's portfolio in our Engineered Materials segment is the high level of customization for high-end applications at selected premium brand owners, and clear orientation to sustainable solutions. Our current portfolio includes sustainable solutions, such as high-content post-consumer recycled ("PCR") polycarbonate and bio-based raw materials. We are developing further solutions to expand our sustainable offering using PCR ABS, PCR TPE, PCR PMMA and recycled MMA ("R-MMA"), which is chemically recycled. Sustainable products represented 5% of Engineered Materials segment volume in 2022 and are a core growth area.

We sell our rigid compounds products mainly under the EMERGE brand for consumer electronics, and under the CALIBRE brand for medical markets. We sell our PMMA products primarily under PLEXIGLAS in the United States and ALTUGLAS in Europe and Asia. We foresee growth and robust demand in applications of building & construction, consumer goods, and especially automotive following constrained production since 2020 as well as continued initiatives toward light-weighting, paint replacement and digitization. Supported by current macro trends, specifically as it relates to safety and health, remote servicing and working, and sustainability, we believe that we have additional growth opportunities in existing consumer electronics applications, including tablets, notebooks, smart phones and other handheld devices, as well as new voice control systems, home entertainment and delivery equipment. We also foresee growth in medical wearables, home equipment, and drug delivery devices. In serving these markets, we leverage our polymer and compound technologies to meet increasingly stringent performance requirements along with our customers' aesthetic and color-matching requirements, which are crucial characteristics for the products involved.

We sell our PMMA sheet products primarily under the trade names ALTUGLAS, PLEXIGLAS, ACRYSPA, AVONITE and STUDIO. We foresee growth in wellness applications such as hot tubs and swim spas as well as sanitary applications like bathtubs. More specifically, we are able to effectively serve these markets through our specialized continuous cast sheet production capabilities that allow us to provide large scale PMMA sheet with specific color requirements. We have also expanded our product offerings into transportation applications and continue to provide customer solutions in architectural applications such as signage and countertops.

We manufacture our TPE soft plastic compounds principally under the trade names MEGOL, APILON, APIGO, and APINAT. Growth in footwear is supported by bio thermoplastic polyurethane ("TPU") solutions in both luxury and sport premium markets, while automotive growth is orientated to hygienic interiors and both robust and smart surfaces.

Competition and Customers

Our main competitors are Sabic, Covestro, Styrolution, LG Chem, and Kingfa for rigid technologies, Kraiburg, Celanese, Avient, Hexpol and BASF for TPEs, and Rohm, Plaskolite, Mitsubishi Chemicals and Schweiter Technologies for PMMA resins and sheets.

We compete in the Engineered Materials segment primarily based on our ability to offer differentiated and reliable products, high quality customer service, and deep relationships with prioritized customers. We believe that growth in this segment will stem from the continued high demand for engineered and sustainable product solutions serving the consumer electronics, automotive, building & construction, wellness, footwear, medical and lighting application markets. We believe our track record of innovation and our focus on differentiated products enhances our growth prospects in this segment. We also believe that our global organization and facilities are a competitive advantage that allows us to provide customers with consistent grades across different regions and positions us to strategically serve emerging markets.

Seasonality

Due to the steady demand state of a portfolio of applications in many markets, such as consumer electronics, medical devices, and footwear, rigid compounds and soft TPE products do not experience significant seasonality. PMMA applications do experience some seasonality due to exposure to automotive and building and construction markets.

Latex Binders Segment

Overview

We are a global leader in styrene-butadiene latex ("SB latex"), holding a strong market position across the geographies and applications in which we compete, including the #1 position in SB latex capacity in Europe and the #1 position in capacity in North America, based on third party data. In 2022, approximately 48% of our Latex Binders segment's sales were generated in Europe, 29% were generated in the United States, and the majority of the remaining net sales were generated in Asia. Additionally, this segment includes the results of our styrene-acrylate latex ("SA latex") production facilities and related infrastructure in the United States, Europe and Asia. As noted above, as part of the Group's transformational strategy, our key area of focus in the Latex Binders segment is to grow our product offerings serving CASE applications, as these offer significantly higher growth and margin potential.

Products and End Uses

We hold the #1 position for supplying latex binders for the coated paper and board market globally. SB latex is widely used as a binder for mineral pigments as it allows high coating speeds, improved smoothness, higher gloss level, opacity and water resistance that is valued in the product's end use in advertising, magazines, and packaging board coatings.

We are also the #1 supplier of latex binders to the carpet and artificial turf market and offer a diverse range of products for use in residential and commercial applications. We produce SB latex, SA latex, vinylidene chloride, and butadiene-methacrylate latex products for the commercial and niche carpet markets. SB latex is also used in flooring as an adhesive for carpet and artificial turf fibers. We continue to implement new chemistries for paper coating and carpet backing applications.

We also offer a broad range of performance latex binders products, including SB latex, SA latex, and vinylidene chloride latex for CASE applications. Net sales to CASE applications made up approximately 13% of total Latex Binders net sales in 2022, with margins of approximately two times the average of products serving all applications within the segment.

Competition and Customers

Our principal competitors in our Latex Binders segment include BASF Group and Synthomer plc. In this segment, we compete primarily based on our ability to offer differentiated and reliable products, the quality of our customer service, and the length and depth of our relationships. This industry has seen capacity reduction and consolidation which we believe could positively impact our competitive standing.

We believe our Latex Binders segment is able to differentiate itself by offering customers value-added formulations and product development expertise. Our R&D team and Technical Services and Development ("TS&D") team are able to use our pilot coating facility, paper fabrication and testing labs, carpet technology centers located near carpet producers, and product development and process research centers to assist customers in designing new products and enhancing their manufacturing processes. Many of our major customers rely on our dedicated R&D and TS&D teams to complement their limited in-house resources for formulation and reformulation tests and trials. We believe that this capability allows us to capture new business, strengthen our existing customer relationships and broaden our technological expertise.

Additionally, our global manufacturing footprint is key in allowing us to serve our customers in a cost-effective manner, as latex binders products are costly to ship over long distances due to their high water content. We believe that our global network of service and manufacturing facilities is highly valued by our customers. We seek to capture the value of our R&D and TS&D services and manufacturing capabilities through our pricing strategy. In 2022, we estimate that more than half of net sales in this segment related to contracts that include raw material pass-through clauses.

Seasonality

Reporting periods impacted by the winter season and unfavorable weather conditions that typically affect the construction and building materials end markets may result in seasonally lower performance, particularly in the CASE applications of our Latex Binders segment.

Base Plastics Segment

Overview

Our Base Plastics segment consists of a variety of compounds and blends, the majority of which are for automotive applications. The segment also includes our ABS, styrene-acrylonitrile ("SAN"), and PC businesses. The Base Plastics segment also includes the results of the Heathland Acquisition, which is focused on converting post-consumer and post-industrial PMMA, PC, ABS, polystyrene, and other thermoplastic waste for use in a wide range of high-end applications. In 2022, approximately 57% of net sales from our Base Plastics segment were generated in Europe, 33% were generated in North America, and 10% were generated in Asia. On January 1, 2023, the Base Plastics segment was renamed to Plastics Solutions to better reflect Trinseo's strategic focus on providing solutions in areas such as sustainability and material substitution.

Products and End Uses

Copolymers. Our copolymers products consist of ABS and SAN. In 2022, copolymers represented approximately 58% of total segment net sales.

We are a leading producer of ABS in Europe and are one of the few global producers, with additional presence in both North America and China. We produce mass ABS ("mABS"), a variation of ABS that has lower conversion and capital costs compared to the more common emulsion ABS ("eABS") process, marketed under our MAGNUM brand. mABS has similar properties to eABS but has greater colorability, thermal stability and lower gloss. mABS products can be manufactured to stricter specifications because they are produced in a continuous process as opposed to the batch process used in eABS. mABS also has environmental benefits such as waste reduction and higher yields. In addition to our own mABS production capacity, we have licensed our proprietary mABS technology to other producers.

Primary end uses for our ABS products include automotive and construction sheet applications. We maintain a significant share of ABS sales into these markets, which we believe is due to the differentiating attributes of our mABS products, our reputation as a knowledgeable and reliable supplier, our broad product mix, and our customer collaboration, including design capabilities.

SAN is composed of styrene and acrylonitrile, which together provide clarity, stiffness, an enhanced ability to be processed, mechanical strength, barrier properties, chemical resistance and heat resistance. SAN is used mainly in appliances, consumer goods and construction sheets, due to its low cost, clarity and chemical resistance properties.

PC. Our PC products are manufactured in Stade, Germany and are sold into various markets as well as consumed internally for our compounding products. In 2022, PC represented approximately 13% of total segment net sales.

PC has high levels of clarity, impact resistance and temperature resistance. PC can be used in its neat form (prior to any compounding or blending) for markets such as construction sheets and profiles, medical and lighting. Additionally, PC can be compounded or blended with other polymers, such as ABS, which imparts specific performance attributes tailored to the product's end use.

Our products for glazing and construction sheets are marketed under the CALIBRE brand name and offer customers a combination of clarity, heat resistance and impact performance. Glazing and construction sheet represents our largest PC application and one of the key end markets is the construction industry.

We approved an asset restructuring plan in the fourth quarter of 2022, which includes the closure of one PC production line to reduce our exposure to the cyclical merchant PC market. We will continue to produce PC for use in our downstream compounding business with the remaining assets. Refer to *2022 Highlights* for further information.

Compounding. Our compounding products consist of PC/ABS compounds, PC blends, and PC and polypropylene compounds. In 2022, compounding products represented approximately 28% of total segment net sales.

We have a significant position in PC/ABS blends, which combine the heat resistance and impact strength of PC with the easy-to-process qualities and resilience of ABS. We have also developed compounds containing PCR content in their products. We believe our ability to offer technologically-differentiated products to meet customer needs sets us apart from our competitors, and with our history as a leading innovator in compounds and blends, we have established ourselves as a leading supplier of PC-based products.

For the automotive industry, we manufacture PC/ABS blends under the PULSE brand, and we innovate collaboratively with our customers to develop performance solutions to meet industry needs, such as reducing the weight of vehicles or providing products using recycled or sustainable content. As a result, we are a key supplier of these products to leading automotive companies in North America and Europe, who tend to specify these products on a per car platform basis, making it difficult to be displaced as a supplier once selected and providing us with relatively stable and predictable cash flows for several years during the production lifecycle. We have an established position in China and are working to further increase our presence in this important market.

Competition and Customers

Our principal competitors in our Base Plastics segment are Covestro AG, Saudi Basic Industries Corporation, INEOS Styrolution, Versalis, Shanghai Kumho Sunny Plastics Co., Ltd., Shanghai Pret Composites Co. Ltd., LG Chem, and Lotte Chemical Corporation. In our Base Plastics segment, we compete primarily based on our ability to offer differentiated and reliable products, the quality of our customer service and the length and depth of our customer relationships.

We believe potential growth in the Base Plastics segment will be impacted by a number of factors, including consumer preference for lighter-weight and impact-resistant products. Additionally, we believe growth prospects are bolstered by sustainability trends such as electric vehicles and potential government mandates, such as the substitution of lighter-weight plastics for metal in automobiles. Therefore, we believe our history of innovation and our focus on differentiated products enhances our growth prospects in this segment. Our innovation has contributed to long-standing relationships with customers who are recognized leaders in their respective end markets. We also believe our global facilities are a competitive advantage that allows us to provide customers with consistent grades across different regions, and positions us to strategically serve emerging markets.

Seasonality

Reporting periods impacted by the winter season and unfavorable weather conditions that typically affect the construction and building materials end markets may result in seasonally lower performance in our Base Plastics segment.

Polystyrene Segment

Overview

We are a leading producer of polystyrene and focus on sales to injection molding and thermoforming customers. In 2022, approximately 68% of net sales from our Polystyrene segment were generated in Europe and 32% of net sales were generated in Asia.

Products and End Uses

Our product offerings include a variety of general purpose polystyrenes ("GPPS") and high impact polystyrene ("HIPS"). HIPS is polystyrene that has been modified with polybutadiene rubber to increase its impact resistant properties. These products provide customers with performance and aesthetics at a low cost across applications, including appliances, packaging, including food packaging and food service disposables, consumer electronics and building and construction materials.

The STYRON™ brand is one of the longest established brands in the industry and is widely recognized in the global marketplace. We believe our R&D capabilities provide valuable, differentiated solutions for our customers, making us well-positioned to address the sustainability, weight reduction, and safety needs.

In 2022 we continued offering recycled polystyrene for food packaging applications for some of our customers through both dissolution and chemical recycling technology. We view recycled polystyrene products as important not only for the benefit of the environment but also as a way to better serve our customers by addressing their need for sustainable solutions.

Competition and Customers

Our principal competitors in our Polystyrene segment are INEOS Styrolution, Versalis S.p.A., Total S.p.A., Sinopec Corp., Formosa Chemicals & Fibre Corp., and Chi Mei Corporation. In this segment, we compete primarily based on our ability to offer reliable and innovative products as well as the quality of our customer service, operational reliability and the length and depth of our relationships.

Our customer-centric model focuses on understanding customers' needs and developing tailored relationships that add value beyond the value of the actual product performance. For durable applications, we focus our efforts on product design engineering initiatives for developing and specifying plastics in the next generation of construction applications and appliances. In non-durable applications, we focus on innovative products that provide clear cost advantages to our customers, serving customers with our cost-advantaged technology and operating excellence. We are also able to offer various sustainable product innovations in our non-durable applications, especially packaging. We have leveraged industry-leading product development and technology capabilities in many of our product lines in this segment to develop long-standing customer relationships, including with a number of customers who have purchased from us, including our predecessor business operated by Dow, for more than 20 years. We believe that our asset footprint is an advantage, allowing us to provide customers with consistent product grades and positioning us to strategically serve growth economies.

Seasonality

Due to the geographic diversity of the Group's customers and end markets for our polystyrene products across the globe, our Polystyrene segment does not typically experience material levels of seasonality. However, sales volumes may fluctuate from quarter-to-quarter as customers may adjust their purchasing patterns based on their expectations of polystyrene price changes.

Feedstocks Segment

Overview

Trinseo is a large consumer of styrene monomer globally. The primary function of our Feedstocks segment is the production of styrene monomer in Europe in order to provide secure sourcing of this key raw material to our other segments. In fact, the majority of the styrene monomer produced by our Feedstocks segment is consumed by our other segments. However, we do sell a portion of our produced styrene monomer to third parties. Overall, our Feedstocks nameplate capacity was 15% of the West European styrene monomer capacity in 2022. We approved an asset restructuring plan in the fourth quarter of 2022, which includes the closure of manufacturing operations at the styrene production facility in Boehlen, Germany to reduce costs and strengthen our competitive position. Refer to *2022 Highlights* for further information.

Products and End Uses

Styrene monomer is a basic building block of plastics and a key input to many of the Group's products. Styrene monomer is a key raw material for the production of polystyrene, expandable polystyrene, SAN resins, SA latex, SB latex, ABS resins, and unsaturated polyethylene resins.

Competition and Customers

Our principal competitors in our Feedstocks segment are: INEOS Styrolution, Versalis S.p.A., Total S.p.A., BASF SE, Saudi Basic Industries Corporation, LyondellBasell, Repsol PLC, and Royal Dutch Shell plc. The majority of styrene monomer produced within the Feedstocks segment is consumed by the Group in our own manufacturing activities.

Global styrene operating rate percentages were around 76% in 2022 and we believe operating rates will drop slightly to the mid to low 70% range and remain at these levels over the next several years before returning to 80% levels. The operating rate could be positively impacted by the potential closure of higher-cost styrene plants. Effective operating rates can, from time to time, be impacted by planned and unplanned outages, leading to periods of elevated margins.

Seasonality

Our Feedstocks segment does not generally experience material levels of seasonality affecting sales volumes; however, there may be seasonal fluctuations in margin as planned supply outages generally occur more often in the spring and fall seasons.

Americas Styrenics Segment

Overview

This segment consists solely of the operations of our 50%-owned joint venture with Chevron Phillips Chemical Company, Americas Styrenics LLC ("Americas Styrenics"), which continues to be a leading producer in North America of both styrene and polystyrene. In 2022, Americas Styrenics was the #1 producer of polystyrene, based on capacity data, and supplied 18% of the styrene monomer capacity in North America. We received a total of $95.0 million in cash dividends from Americas Styrenics during 2022. We estimate that the contribution to our equity earnings from Americas Styrenics' polystyrene business was approximately 71% in 2022 and 72% in 2021.

Products and End Uses

Styrene monomer is a basic building block of plastics and a key input to many of the Group's products. Styrene monomer is a key raw material for the production of polystyrene, and in 2022 approximately 64% of the styrene monomer produced by Americas Styrenics was consumed in its own production of polystyrene. The remainder of

Americas Styrenics' product is sold as a key raw material to other manufacturers of polystyrene, expandable polystyrene, SB latex, ABS resins, unsaturated polyethylene resins, and styrene-butadiene rubber.

Americas Styrenics also produces GPPS, high heat, high impact resin, and STYRON A-TECH™ polystyrene products. Major applications for these polystyrene products include appliances, food packaging, food service disposables, consumer electronics, and building and construction materials.

Competition and Customers

Americas Styrenics' principal competitors are INEOS Styrolution, Total S.p.A., and LyondellBasell. In our Americas Styrenics segment, we compete primarily based on our ability to offer reliable products as well as the quality of our customer service and the length and depth of our relationships.

As a leading styrenics producer in North America, this segment is well-positioned to benefit from consolidation dynamics in the styrene and polystyrene industries within the region. As noted above in the Feedstocks segment section, global styrene operating rate percentages were around 76% in 2022 and we believe they will drop slightly to the mid to low 70% range over the next several years, with the potential for positive upside if there are closures of higher-cost styrene plants. Effective operating rates can, from time to time, be impacted by planned and unplanned outages, leading to periods of elevated margins.

Seasonality

Reporting periods impacted by the winter season and unfavorable weather conditions that typically affect the construction and building materials end markets may result in seasonally lower performance in our Americas Styrenics segment.

Our Relationship with Dow

Following the Dow Separation, we entered into certain long-term agreements with Dow to provide services that would ease our transition into a standalone company. In recent years, the Group has successfully migrated a substantial level of systems and services support away from Dow. However, we continue to maintain a significant relationship with Dow for certain technology and site services, as well as the supply of certain key raw materials. The failure of Dow to perform their obligations, or the termination of these agreements, could adversely affect our operations. See *Principal Risks and Uncertainties* for more information.

We are party to various site services agreements ("SAR SSAs") for Dow to provide site services to the Group at Dow-owned sites. Conversely, we entered into similar agreements with Dow, where, at Group-owned sites, we provide such services to Dow. These agreements cover general services that are provided at certain facilities co-located with Dow, including utilities, site administration, environmental health and safety, site maintenance and supply chain. These agreements generally have 25-year terms and include options to renew. These agreements may be terminated at any time by agreement of the parties, or, by either party, for cause or under certain circumstances for a material breach. In addition, we may terminate with 12-months' prior notice to Dow any services identified in any SAR SSA as "terminable." Highly integrated services, such as electricity and steam, generally cannot be terminated prior to the termination date unless we experience a production unit shut down for which we provide Dow with 15-months' prior notice, or upon payment of a shutdown fee. Upon expiration or termination, we would be obligated to pay a monthly fee to Dow for a period of 45 to 60 months following the expiration or termination of such SAR SSA. The agreements under which Dow receives services from us may be terminated under the same circumstances and conditions.

Additionally, we are party to several agreements with Dow for the provision of certain raw materials, products and services and other operational arrangements. Dow provides a large percentage of certain raw materials used in the production of our products, under agreements that are important to our business. In connection with the 2021 acquisition of the PMMA and MMA businesses from Arkema S.A. (the "PMMA Acquisition"), the Group assumed a Capacity Reservation Contract ("CRC") which is an evergreen contract that provides guaranteed access to a certain portion of MMA capacity at a Dow-owned manufacturing facility in North America. See *Sources and Availability of Raw Materials* for more information.

Under the Amended and Restated MOD5 Computerized Process Control Software, Licenses and Services Agreement, with Rofan Services ("AR MOD5 Agreement"), Dow provides worldwide process control technology, including hardware, software licenses and support services, and related enterprise resource planning services. The AR MOD5 Agreement has a term through December 2023 and may be terminated by either party for cause or uncured material breach; by Trinseo if we no longer wish to receive maintenance and support for any licensed software; or by Dow if we use the licensed software for any purposes other than Group business. Dow may terminate the maintenance and support terms at any time if we fail to make payments when due. With the exception of one remaining site, as of December 31, 2022, we have converted all other plant locations from the MOD5 process control technology and are no longer reliant on Dow for this service. We expect to convert the remaining site by the end of 2024.

The Second Amended and Restated Master Outsourcing Services Agreement ("SAR MOSA") provides for ongoing worldwide services, substantially all of which were no longer provided by Dow as of December 31, 2020, following our transition of these services over the last several years. The Group did not incur significant costs related for the SAR MOSA in 2022, nor do we expect to incur any further costs going forward.

For the years ended December 31, 2022 and 2021 we incurred a total of $273.9 million and $214.9 million, respectively, in expenses under the SAR MOSA, AR MOD5 Agreement, and SAR SSAs (which include utilities), including $270.6 million and $210.3 million, respectively, for both the variable and fixed cost components of the site services agreements and $3.3 million and $4.5 million, respectively, covering all other agreements.

For the years ended December 31, 2022 and 2021, purchases and other charges from Dow and its affiliated companies (excluding the SAR MOSA, AR MOD5 Agreement, and SAR SSAs) were approximately $688.7 million and $1,143.9 million, respectively. These purchases and other charges primarily relate to the purchase of raw materials for manufacturing our products. Additionally, for the years ended December 31, 2022 and 2021, sales to Dow and its affiliated companies were approximately $146.7 million and $156.4 million, respectively.

Sources and Availability of Raw Materials

The prices of our key raw materials are volatile and can fluctuate significantly over time. While the predominant reason for this volatility is the impact of market imbalances in supply and demand from time to time, energy prices, transportation costs and supplier force majeures have impacted and may continue to impact the volatility of some of our raw materials. The table below shows our key raw materials by reporting segment.

	Latex Binders	Engineered Materials	Base Plastics	Polystyrene	Feedstocks	Americas Styrenics
Acetone		X				
Benzene					X	X
Bisphenol A			X			
Butadiene	X		X			
Ethylene					X	X
Methyl Methacrylate (MMA)		X				
Polycarbonate		X	X			
Styrenic resins		X	X			
Styrene	X		X	X	X	X

We have supply contracts in place to help maintain our supply of raw materials at competitive market prices and seek to implement the most efficient and reliable raw material strategy for each of our segments, including utilizing multiple sources where feasible and maintaining a balance between contracted and spot purchases of raw materials. We also produce raw materials for use by our businesses, such as styrene monomer, PC, and MMA, and we purchase PCR materials for use in products such as our PC compounds.

In 2022, we obtained approximately 18% of our raw materials from Dow (based on aggregate purchase price). In 2022, Dow supplied us with approximately 69% of our benzene requirements and 100% of our ethylene requirements. Dow continues to be our largest supplier for these raw materials as well as a significant supplier of butadiene. Our current supply agreements with Dow for ethylene, benzene, and butadiene commenced in 2021 and have contractual terms of two to five years, with renewal provisions. PMMA products use MMA as the key raw material, which is sourced through both our own production in Europe and through supply agreements. During 2022, Dow has supplied us with an aggregate 52% of the MMA used in our PMMA production, both in the United States under the CRC, as well as through other unrelated supply agreements.

While Dow provides a significant portion of our raw materials pursuant to these supply agreements, we have developed a comprehensive strategy for obtaining additional sources of supply where needed. Other supply sources in Europe include major producers with contract terms of up to five years at competitive market prices. Supply of benzene and ethylene to North America and Asia are exclusively from other diversified sets of major third-party producers via supply contracts. We rely primarily on the CRC for a majority of our MMA needs in the United States, but can source MMA from other manufacturers in the North America and Europe, as well as from our own production. In 2022, our manufacturing sites provided approximately 39% of our global MMA supply. We source raw materials for our MMA production (acetone and ammonia) primarily from two suppliers in Italy.

In 2022 we obtained 79% of our styrene supply through long-term strategic contracts and spot market purchases. Additionally, our internal production of styrene from purchased ethylene and benzene at our own manufacturing sites provided 21% of our styrene supply in 2022. With this mix of purchased and produced styrene, we seek to optimize our overall costs of securing styrene through efficient logistics, manufacturing economics and market dynamics.

Bisphenol A (“BPA”) is the major raw material associated with PC production. Our primary supplier of this raw material in 2022 was a subsidiary of Olin Corporation which provided BPA via pipeline, and we have obtained more diverse supply options for BPA in 2023. Acetone, a key material for producing MMA, is supplied via long term agreements with Versalis in Europe.

Technology

Our R&D and TS&D activities across our segments focus on identifying needs in our customers’ end markets. As part of our customer-centric model, our R&D/TS&D organization interfaces with our sales and marketing teams and directly with customers to determine their product requirements, considering industry and market segment trends. This information is used to select R&D/TS&D projects that are value-enhancing for both our customers and Trinseo.

Our innovation and technology centers support our technological and R&D/TS&D capabilities. In addition, our R&D/TS&D efforts are also supported by certain “mini-plants” operated by our businesses in Stade. These mini plants are used to make samples of experimental products for testing, which we believe is a critical step in our new product development process. We also operate a plastics research center, which integrates two existing technical support centers and research lab operations in a single location at our Terneuzen, The Netherlands office location. Further, we operate pilot plants to facilitate new production technology, including a TPE pilot facility in Hsinchu, Taiwan which enables close collaboration with Asia Pacific customers for sustainably advantaged materials in targeted markets including consumer electronics, medical, footwear, and automotive. Finally, two R&D centers in Europe and three R&D centers in the United States, are responsible for the design of PMMA products at the Group’s eight global acrylic manufacturing plants.

R&D and TS&D costs are included in expenses as incurred. Our R&D and TS&D costs were $51.4 million and $63.9 million for the years ended December 31, 2022 and 2021, respectively.

Sales and Marketing

We have a customer-centric business model that has helped us to develop strong relationships with many customers. Our sales and marketing professionals are primarily located at our facilities or at virtual offices within their respective geographies. We have approximately 217 professionals working in sales and marketing around the world, along with approximately 99 customer service professionals and we sell our products to customers in approximately 80 countries. We primarily market our products through our direct sales force. Typically, our direct sales are made by our employees in the regions closest to the given customer.

Intellectual Property

We evaluate on a case-by-case basis how best to utilize patents, trademarks, copyrights, trade secrets and other intellectual property to protect our products and our critical investments in research and development, manufacturing and marketing. We focus on securing and maintaining patents for certain inventions, while maintaining other inventions as trade secrets, derived from our customer-centric business model, to maximize the value of our product portfolio and manufacturing capabilities. Our policy is to seek appropriate protection for significant product and process developments in the major markets where the relevant products are manufactured or sold. Patents may cover products, processes, intermediate products and product uses. Patents extend for varying periods in accordance with the date of patent application filing and the legal life of patents in the various countries. The protection afforded, which may also vary from country to country, depends upon the type of subject matter covered by the patent and the scope of the claims of the patent. The intellectual property that we have created or acquired since our formation covers areas such as material formulations, material process technologies and various end-use industrial applications.

In most industrial countries, patent protection may be available for new substances and formulations, as well as for unique applications and production processes. However, given the geographical scope of our business and our continued growth strategy, there are regions of the world in which we do business or may do business in the future where intellectual property protection may be limited and difficult to enforce. We maintain strict information security policies and procedures wherever we do business. These information security policies and procedures include data encryption, controls over the disclosure and safekeeping of confidential information, as well as employee awareness training. Moreover, we monitor our competitors' products and, if circumstances were to dictate that we do so, we would vigorously challenge the actions of others that conflict with our patents, trademarks and other intellectual property rights.

The technologies we utilize in some of our businesses have been in use for many years (e.g., SB latex, polystyrene, styrene, PMMA and ABS) and a number of our patents relating to such technologies have expired or will expire in the future. As patents expire, or are allowed to lapse, the products and processes described and claimed in those patents become generally available for use by the public. We believe that the expiration of any single patent or family of patents that is scheduled to expire in the next three years would not materially adversely affect our business or financial results. We believe that our trade secrets relating to manufacturing and other processes used in connection with products to which expiring patents relate will continue to provide us with a competitive advantage after the expiration of these patents.

We use trademarks as a means of differentiating our products. We protect our trademarks against infringement where we deem appropriate. We have successfully registered the TRINSEO™ trademark in more than 130 countries, and acquired the Plexiglas®, Altuglas®, Solarkote® and Oroglas® marks as well as other trademarks in the PMMA Acquisition.

Dow has either transferred to us or granted perpetual, royalty-free licenses to us to use Dow's intellectual property that was used by Dow to operate the acquired business (the "Dow Acquired Business") prior to the Dow Separation. This intellectual property includes certain processes, compositions and apparatus used in the manufacture of certain of our legacy products. In addition to our license rights to use Dow's intellectual property related to the Dow Acquired Business, we have obtained licenses to use Dow's intellectual property to the extent necessary to perform our obligations under the contracts transferred to us in the Dow Separation and to use such intellectual property (other than patents) for products outside of the Dow Acquired Business as it was conducted by Dow prior to the Dow Separation, subject to certain limitations. While we believe our license rights with respect to Dow's intellectual property are sufficient to allow us to operate our current business, new growth opportunities in latex binders, and to a lesser extent copolymer plastics, involving new products may fall outside of our license rights with Dow. Therefore, our ability to develop new products may be impacted by intellectual property rights that have not been licensed to us by Dow. We have the right, with Dow's cooperation, to directly enforce the patents that are exclusively licensed to us by Dow where infringement is primarily within the scope of our business; but nothing obligates Dow to enforce against third parties the intellectual property rights of Dow that are licensed to us on a non-exclusive basis or where the infringement is primarily outside the scope of our business.

Environmental, Health, Safety and Product Stewardship

Obtaining, producing and distributing many of our products involve the use, storage, transportation and disposal of toxic and hazardous materials. We are subject to extensive, evolving and increasingly stringent national and local environmental and safety laws and regulations, which address, among other things:

- emissions to the air;
- discharges to soils and surface and subsurface waters;
- other releases into the environment;
- prevention, remediation or abatement of releases of hazardous materials into the indoor or outdoor environment;
- generation, handling, storage, transportation, treatment and disposal of waste materials;
- climate change impacts;
- process and maintenance of safe conditions in the workplace;
- registration and evaluation of chemicals;
- production, handling, labeling or use of chemicals used or produced by us;
- stewardship of products after manufacture; and
- circular solutions, for polystyrene and other products.

We monitor compliance with applicable state, national, and international environmental, health and safety requirements and maintain policies and procedures to monitor and control environmental, health and safety risks, which may in some circumstances exceed the requirements imposed by applicable law. We have a strong environmental, health and safety organization with a staff of professionals who are responsible for environmental, health, safety and product regulatory compliance and stewardship, in addition to comprehensive standards and tools. We supplement our programs with our participation in trade associations which monitor developments in legislation impacting our businesses. Additionally, our Supplier Code of Conduct includes our expectations for our suppliers to comply with applicable laws and regulations and encourages them to adhere to the highest principles of environmental responsibility.

We follow the American Chemistry Council Responsible Care® Guiding Principles for our global facilities and products and have received third party certification of our Responsible Care® Management System. Many of our facilities have been certified to ISO 14001 and other ISO management systems. We have a mature corporate environmental, health and safety audit program for all of our facilities. We focus on emergency preparedness, crisis planning and drills, at both the facility and corporate level. We expect that stringent environmental regulations will continue to be imposed on us and our industry in general.

Sustainability and Climate Change

We recognize that climate change has had and will continue to have significant impacts on our environment, particularly as it relates to extreme weather conditions and rising sea levels, and which has prompted regulations limiting, among other things, the emission of greenhouse gases. In the countries in which we operate, particularly in the EU, we are required to comply with increasingly extensive regulations to address climate change impacts and resource conservation requirements. We also monitor legislative actions and their potential impacts on the end markets we serve.

We track and publicly report our greenhouse gas emissions, water usage, waste, and energy consumptions and our facilities work to improve our performance at reducing chemical emissions, water usage and energy consumption. Our Sustainability and Corporate Social Responsibility Report (the “Sustainability Report”), which is available on our website, provides our most recent sustainability highlights for our products, performance and operations. The report highlights sustainability goals and other initiatives to improve our sustainability performance. While we do expect to incur costs to comply with legislation enacted as a result of climate change and other sustainability efforts, such as new disclosure rules in the European Union and proposed disclosure rules in the United States, we do not expect that these costs will be material to our operations and consolidated financial position in the next 12 months.

Sustainability is a key focus area of our long-term strategy and during 2022 we continued to take actions to further our offering of sustainable products. We have announced a collaboration with Japan Steel Works to produce recycled MMA, which will be used in the development of circular PMMA solutions for various applications including automotive, building & construction, lighting, appliances, and sanitary ware. We also took action to increase our access to recycled feedstocks through the acquisition of plastics collector and recycler Heathland, which closed in January 2022.

In addition, we achieved ISCC certification for Mass Balance processes for polystyrene manufactured at our Tessenderlo, Belgium plant, as well as for PC produced in Stade, Germany, and styrene manufactured in Terneuzen, The Netherlands. We also supplemented an already strong annual Sustainability Report with the incorporation of the Task Force on Climate-Related Financial Disclosures ("TCFD") framework, and the Global Reporting Initiative ("GRI") framework, in addition to the Sustainability Accounting Standards Board ("SASB") framework. These achievements were accomplished while maintaining our high standard for safety and Employee Health & Safety ("EH&S") excellence. We expect the costs of administering our sustainability program to increase as we continue to focus and improve our sustainability initiatives and reporting.

Environmental Remediation

Environmental laws and regulations require mitigation or remediation of the effects of the disposal or release of chemical substances. Under some of these regulations, as the current owner or operator of a property, we could be held liable for the costs of removal or remediation of hazardous substances on or under the property, without regard to whether we knew of or caused the contamination, and regardless of whether the practices that resulted in the contamination were permitted at the time they occurred. Many of our production sites have an extended history of industrial use, and it is impossible to predict precisely what effect these laws and regulations will have on us in the future. Soil and groundwater contamination have occurred at some of the sites and might occur or be discovered at other sites. Subject to certain monetary and temporal limitations, Dow is obligated to indemnify and hold us harmless with respect to releases of hazardous material that existed at our sites prior to the Dow Separation. The period for new claims at these sites has expired. Later-acquired sites are subject to a different limitations period. We cannot be certain that Dow will fully honor their existing indemnity obligations or that the indemnity will be sufficient to satisfy all claims that we may incur. Other than certain immaterial environmental liabilities assumed as part of the PMMA Acquisition and the 2021 acquisition of Aristech Surfaces LLC, a manufacturer and global provider of PMMA continuous cast and solid surface sheets, (the "Aristech Surfaces Acquisition"), no environmental claims have been asserted or threatened against the Group. Any active remedial projects on our properties which were part of the Dow Separation are being performed by Dow pursuant to its indemnification obligations. Other than certain immaterial environmental liabilities assumed as part of the PMMA Acquisition and the Aristech Surfaces Acquisition, no environmental claims have been asserted or threatened against the Group, and the Group is not a potentially responsible party for any material amounts at any Superfund Sites. We conduct comprehensive environmental due diligence for potential acquisitions to mitigate the risk of assuming obligations to conduct material levels of environmental remediation.

Board Oversight

The Environmental, Health, Safety, Sustainability and Public Policy Committee (the "EHSS&PP Committee") of the Group's Board of Directors assists the Board with oversight of Company programs, policies and initiatives that support the environment, health and safety, sustainability, corporate social responsibility and climate change. The EHSS&PP Committee is responsible for supporting alignment between the Group and the Board on the Group's sustainability, social, and public policy goals; guiding the Group and overseeing management of risks arising from our sustainability programs, policies, partnerships, activities and goals; reviewing external public policy/governmental affairs issues and trends, and recommending Company response to these issues. The EHSS&PP Committee also reviews the Group's annual Sustainability Report for Board approval and publication on the Group's website.

Government Regulation

In addition to environmental, health, and safety laws and regulations, our operations subject us to numerous federal, state, and local laws and regulations in the countries in which we operate. International trade laws and trade agreements, export and customs controls can limit the countries in which we can do business, or add significant cost to the import or export of our products or raw materials. Changes to or violations of these regulations could impact the costs of our goods or cause delay in shipments. Our products are also used in a variety of end-uses that have specific regulatory or consumer safety requirements such as those relating to food packaging or medical devices. Changes in these requirements could result in increased compliance costs, product recalls, or fines, which could prevent or inhibit the development and sale of our products. These and other laws and regulations impact the manner in which the Group conducts its business, and changes in legislation or government regulations can affect the Group's global operations, both favorably and unfavorably. For a more detailed description of the various laws and regulations that affect the Group's business, see *Principal Risks and Uncertainties*.

Security

We recognize the importance of security and safety to our employees and the community. Physical security measures have been combined with process safety measures (including the use of technology) and emergency response preparedness into integrated security plans. We have conducted information security assessments at our operating facilities worldwide and identified and implemented appropriate measures to protect these facilities from physical and cyber-attacks. Effort and resources in assessing security requirements at our manufacturing facilities will continue, as required by U.S. Department of Homeland Security and other requirements.

Trinseo has implemented information security solutions, resources, policies, programs, and monitoring alerts to respond to potential information security events and to maintain compliance with the increasing amount of data privacy laws and regulation. Our Board of Directors provides oversight of security risks, measures and incidents, with input from members of management and our information security team.

Human Capital Resources and Objectives

As of December 31, 2022, we had approximately 3,400 employees worldwide, with the majority (approximately 56%) located in the EMEA region (Europe, Middle East and Africa), approximately 15% in Asia Pacific, and the remainder in the Americas. Approximately 97% of our workforce is full-time.

Nearly 70% of our personnel are located at the various manufacturing sites, research and development, pilot coating, paper fabrication and testing and technology centers. The remaining employees are located at operating centers, virtual locations or geographically dispersed marketing and sales locations. Our facilities in Midland, Michigan, Bristol, Pennsylvania, and Louisville and Florence, Kentucky, and our facility in Matamoros, Mexico have union representation, while employees at certain of our other locations are represented by work councils. We believe we maintain good relations with our personnel and various labor organizations. There have been no labor strikes or work stoppages in these locations in recent history.

People Strategy

We strive to retain a talented, diverse and inclusive workforce and understand that our success requires ongoing investment in our employees. Our approach to attracting and retaining talent is our commitment to our core values of Responsible Care®, Innovation, Respect & Integrity, Accountability & Value Creation, and Commitment to Customers. As applied to our employees, these values prioritize health and safety, accountability and rewards for achievement, and treatment of all persons in our organization with respect, honesty, and dignity.

Our core values are reflected in the goals of our "People Strategy," which is designed to support employees through Organizational Development, Talent Management, Diversity, Equity & Inclusion and Recognition & Rewards. Organizational Development focuses on the design of organization models to achieve our business strategies, assess employee engagement, shape our culture and facilitate open communication. Talent Management measures our ability to attract and select the right talent for the right roles, onboard new employees to improve integration, build critical capabilities, and develop leaders of the future, with a culture of collaboration among high-performing and diverse teams. Diversity, Equity & Inclusion challenges us to create and maintain an environment that welcomes a broad range of diverse talent and facilitates and fosters a culture of inclusion. Recognition & Rewards means our efforts to manage, measure, and pay for performance; differentiate and recognize job growth with base salary increases, promotions, new assignments, annual performance awards and recognition of outstanding contributions from employees.

Environmental Protection and Employee Health & Safety

Focus on the safety of our employees is a critical aspect of our operations. We strive towards achieving zero injuries, spills, or process safety incidents in our facilities every year, and in 2022, 74% of our eligible facilities reached this goal. Our EH&S management system promotes a culture of rigorous investigation, corrective action, and continuous improvement applied over many years and has delivered a world-class set of internal safety policies, processes, and procedures. This system is designed to meet our objectives to continually reduce safety and environmental incidents and risks, maintain full regulatory compliance, satisfy stakeholder expectations, optimize resources, and continuously improve. We have developed a set of leading indicators to help highlight and drive improvement in Operational Safety, Process Safety, and Product Safety across the Group, with effectiveness of these indicators assessed on a regular basis and modified as needed to drive improvement.

The COVID-19 pandemic continued to present risks to employee health and safety in 2022, including the rise in variants and lockdown protocols in China. We established a COVID-19 response team to address issues impacting our employees in different regions. Trinseo established a voluntary vaccination incentive program to encourage employees to receive their vaccines. We also implemented COVID-19 employee safety training, a training program for those working remotely, and provided a stipend to employees working at home to purchase office furniture, ergonomic equipment, and other items to establish a safe work from home environment. We also developed an award program to recognize those employees at manufacturing sites who could not work from home with additional financial compensation. These actions have helped our employees remain safe during this unprecedented time and reward employees for their continued dedication to Trinseo.

Principal Risks and Uncertainties

Risks Related to Our Operations

We are subject to risks associated with the Group's strategy to transform its portfolio to a specialty materials and sustainable solutions provider.

We have taken steps toward executing on our strategy to transform the Group to a specialty materials and sustainable solutions provider, including the PMMA Acquisition, Aristech Surfaces Acquisition and the sale of our synthetic rubber business ("Rubber Business"). We also initiated a formal process to divest our styrenics business, which was paused due to deterioration of financing markets and global economic instability, but which sale remains an integral part of our transformation strategy. We plan to continue to prioritize investments in higher growth, higher margin and lower earnings volatility areas such as Engineered Materials and CASE applications, and to deemphasize the more volatile, lower growth assets in our portfolio. In December 2022, we announced approval of an asset restructuring plan designed to reduce costs, improve profitability, and reduce exposure to cyclical markets and elevated natural gas prices, which includes (i) closure of manufacturing operations at our styrene production facility in Boehlen, Germany, (ii) closure of one of our production lines at our Stade, Germany polycarbonate plant, (iii) closure of our PMMA sheet manufacturing site in Matamoros, Mexico and (iv) reduction of SB latex capacity at our Hamina, Finland plant.

The implementation of our transformation strategy has resulted in, and may continue to result in, changes to our business, operations, capital allocation, operational and organizational structure, increased demands on management, and could result in short-term and one-time costs, including higher than expected restructuring costs, loss of revenue, and other negative impacts on our business. We cannot guarantee that the execution of this strategy, including the steps taken to date, will lead to higher growth, higher margins and lower earnings volatility. We also cannot be certain that we will be successful in identifying opportunities for divestiture of our styrenics business or identifying investments in assets we believe best fit our portfolio transformation, whether such opportunities will be available at a price and at terms acceptable to us, or at all, or whether we will face difficulties due to timing or funding availability. Implementation of this transformation may take longer than anticipated, and once implemented, we may not realize, in full or in part, the anticipated benefits or such benefits may be realized more slowly than anticipated. The failure to realize benefits, which may be due to our inability to execute, delays in implementation, global or local economic conditions, accessibility to capital markets, inflation, high interest rates, competition, and the other risks described herein, could have a material adverse effect on our business, prospects, financial condition, results of operations, cash flows, as well as the trading price of our securities.

Volatility in the cost of raw materials or disruption in the supply of the raw materials utilized for our products, may adversely affect our financial condition and results of operations or cause our financial results to differ materially from our forecasts.

Our results of operations can be directly affected, positively and negatively, by volatility in the cost of our raw materials, which are subject to global supply and demand and other factors beyond our control. Our principal raw materials (benzene, ethylene, butadiene, BPA, MMA, and styrene) together represent approximately 45% of our total cost of goods sold. Crude oil prices also impact our raw material and energy costs. Generally, higher crude oil prices lead to higher costs of natural gas and raw materials, although some raw materials are impacted less than others. Volatility in the cost of energy or raw materials makes it more challenging to manage pricing and pass the increases on to our customers in a timely manner. We believe that rapid changes in pricing also can affect the volume our customers consume. As a result, our gross profit and margins could also be adversely affected and our financial results may differ materially from our forecasts.

We have supply agreements with Dow for ethylene, benzene, butadiene, and MMA, which are critical raw materials to our business. These raw materials and other less critical materials amount to approximately 18% of our total raw materials acquired in 2022, based on aggregate purchase price. The remainder is purchased via other third-party suppliers on a global basis. As these and other third-party supply agreements expire, we may be unable to renegotiate or renew these contracts, or obtain new long-term supply agreements on terms comparable or favorable to us, or at all, which may significantly impact our operations. See *Sources and Availability of Raw Materials*.

If the availability of any of our principal raw materials is limited, we may be unable to produce some of our products in the quantities demanded by our customers, which could have an adverse effect on plant utilization and our sales of products requiring such raw materials. Suppliers may have temporary limitations preventing them from meeting our requirements, and we may not be able to obtain substitute alternative suppliers in a timely manner or on favorable terms.

Increased energy costs and supply constraints, including as a result of the ongoing conflict in Ukraine, could adversely impact our results of operations.

We use natural gas and electricity to operate our facilities and generate heat and steam for our various manufacturing processes, and these operations can be directly affected by volatility in the cost and availability of energy, which is often subject to factors outside of our control. The ongoing conflict between Russia and Ukraine has impacted global energy markets, particularly in Europe, leading to high volatility and increased prices for natural gas and other energy supplies. Reductions in the supply of natural gas from Russia to Europe has led to ongoing supply shortages in Europe, and in 2022 European Union member states agreed to a voluntary short-term reduction of natural gas usage as a result of these shortages. Continued natural gas supply shortages, or a shutdown of natural gas supply from Russia, could lead to additional price increases, energy supply rationing, or temporary reduction in operations or closure of our manufacturing plants, which could have a material adverse impact on our business or results of operations.

We have entered into certain commodity swap agreements to protect against fluctuations in energy prices, including natural gas, and we may continue to enter into commodity swaps, forward contracts, or options from time to time. Our hedges against energy price volatility could adversely impact our results of operations.

Production at our manufacturing facilities could be disrupted for a variety of reasons. Disruptions could expose us to significant losses or liabilities.

The hazards and risks of disruption associated with chemical manufacturing and the related storage and transportation of raw materials, products and wastes exist in our operations and the operations of other occupants with whom we share manufacturing sites. These potential risks of disruption include, but are not necessarily limited to:

- pipeline and storage tank leaks and ruptures;
- explosions and fires;
- inclement or extreme weather and natural disasters, which may be aggravated by climate change;
- disease outbreaks, epidemics or pandemics, and government responses thereto, which may impact our employees or those of our suppliers or transportation providers;
- terrorist attacks;
- cyber-attacks;
- failure of mechanical systems, computer systems, process safety and pollution control equipment;
- failures or delays in properly implementing new technologies and processes;
- chemical spills and other discharge or releases of toxic or hazardous substances or gases; and
- exposure to toxic chemicals.

These hazards could expose employees, customers, the community and others to toxic chemicals and other hazards, contaminate the environment, damage property, result in personal injury or death, lead to an interruption or suspension of operations, damage our reputation and adversely affect the productivity and profitability of a particular manufacturing facility or us as a whole, and result in the need for remediation, governmental enforcement, regulatory shutdowns, the imposition of government fines and penalties, and claims brought by governmental entities or third parties. Legal claims and regulatory actions could subject us to both civil and criminal penalties, which could affect our product sales, reputation and profitability. Furthermore, the environmental, health and safety compliance, management systems, and emergency response and crisis management plans we have in place may not address or foresee all potential risks or causes of disruption.

If disruptions occur, alternative facilities with sufficient capacity or capabilities may not be available, may cost substantially more or may take a significant time to start production. Each of these scenarios could negatively affect our business and financial performance. If one of our key manufacturing facilities is unable to produce our products for an extended period of time, our sales may be reduced by the shortfall caused by the disruption and we may not be able to meet our customers' needs, which could cause them to seek other suppliers. Furthermore, to the extent a production disruption occurs at a manufacturing facility that has been operating at or near full capacity, the resulting shortage of our product could be particularly harmful because production at the manufacturing facility may not be able to reach levels achieved prior to the disruption. Our insurance policies may not fully insure against all potential causes of disruption due to limitations and exclusions in those policies. Therefore, incidents that significantly disrupt our operations may expose us to significant losses and/or liabilities.

Compliance with extensive and evolving environmental, health and safety laws may require substantial expenditures.

We use large quantities of hazardous substances, generate hazardous wastes and emit wastewater and air pollutants in our manufacturing operations. Consequently, our operations are subject to extensive environmental, health and safety laws and regulations at both the national and local level in multiple jurisdictions. Many of these laws and regulations have become more stringent over time and the costs of compliance with these requirements may continue to increase, including costs associated with any capital investments for pollution control facilities. In addition, our production facilities and operations require operating permits, licenses or other approvals that may be subject to periodic renewal and, in circumstances of noncompliance, may be subject to revocation. The necessary licenses, permits or other approvals may not be issued or continue in effect, and any issued licenses, permits or approvals may contain more stringent limitations that restrict our operations or that require further expenditures to meet the permit requirements.

This continuing focus on climate change in jurisdictions in which we operate has and will continue to result in new environmental regulations that may require us to incur additional costs in complying with new regulatory and customer requirements, which may adversely impact our operations and financial condition. Compliance with more stringent environmental requirements would likely increase our costs of transportation and storage of raw materials and finished products, as well as the costs of storage and disposal of wastes. Additionally, we may incur substantial costs, including penalties, fines, damages, criminal or civil sanctions and remediation costs for the failure to comply with these laws or permit requirements.

If we are unable to execute on our capital projects or growth plans within their expected budget and timelines, or if the market conditions assumed in our projections deteriorate, our business, financial condition, results of operations and cash flows could be materially and adversely affected.

Capital projects and other growth investments may have lengthy deadlines during which market conditions may deteriorate between the capital expenditure's approval date and the conclusion of the project, negatively impacting projected returns. Cost-saving measures and capital allocation priorities may impact our decision whether to undertake or delay the start of certain capital projects in the near future. Delays or cost increases related to capital and other spending programs involving engineering, procurement and construction of facilities or manufacturing lines or the development of new technologies could materially adversely affect our ability to achieve forecasted operating results. Project delays or budget overages may arise as a result of unpredictable events, which may be beyond our control, including, but not limited to:

- denial of or delay in receiving requisite regulatory approvals, licenses and/or permits;
- unanticipated increases in the cost of construction materials, labor, or utilities;
- disruptions in transportation of components or construction materials;

- adverse weather conditions or natural disasters, equipment malfunctions, explosions, fires or spills affecting our facilities, or those of vendors or suppliers;
- disease outbreaks, epidemics or pandemics, and government responses thereto;
- shortages of sufficiently skilled labor, or labor disagreements resulting in unplanned work stoppages; or
- non-performance by, or disputes with, vendors, partners, suppliers, contractors or subcontractors.

Furthermore, presumed demand for the technologies or products provided by the manufacturing facilities or lines being constructed or the technologies being developed may deteriorate during the project period. If we were unable to stay within a project's overall timeline or budget, or if market conditions change, it could materially and adversely affect our business, financial condition, results of operations and cash flows.

If we are not able to continue the technological innovation and successful commercial introduction of new products, our customers may turn to other producers to meet their requirements.

Our industry and the end markets into which we sell our products experience periodic technological changes and ongoing product improvements. Our customers may introduce new generations of their own products or require new technological and increased performance specifications that would require us to develop customized products. Our future growth will depend on our ability to predict and react to changes in key end markets, and to successfully develop, manufacture and market products in such changing end markets. We need to continue to identify, develop and market innovative products on a timely basis to replace existing products in order to maintain our profit margins and our competitive position. We may not be successful in developing new products and technology that successfully compete with these materials, and our customers may not accept any of our new products. If we fail to keep pace with evolving technological innovations or fail to modify our products in response to our customers' needs, then our business, financial condition and results of operations could be adversely affected as a result of reduced sales of our products.

Risks Related to Acquisitions and Dispositions

We may not be successful in the proposed divestiture of our styrenics businesses.

In May 2023, we announced our intention to restart the sale of our styrenics business, which had been paused since July 2022, including marketing of individual businesses and sites. While the divestiture of our styrenics businesses remains a key part of our transformation strategy, we cannot estimate whether economic conditions and capital markets will sufficiently improve to allow us to restart and successfully complete a sale of all or a portion of our styrenics business, or guarantee that we will be successful in our efforts to restart the sale process, generate interest in a sale of all or a portion of the business, locate an adequate buyer or buyers, or negotiate terms of a sale acceptable to the Group.

A successful divestiture depends on various factors, including our ability to effectively transfer liabilities, contracts, facilities and employees to any purchaser, revise our legal entity structure, negotiate continued equity ownership, identify and separate intellectual property, reduce fixed costs previously associated with the divested assets or business, and collect the proceeds from any sale. Any divestiture may result in a dilutive impact to our future earnings if we are unable to offset the dilutive impacts from the loss of revenue associated with the divested business, as well as significant write-offs, including those related to goodwill and other intangible assets, which could have a material adverse effect on our results of operations and financial condition. All of these efforts require varying levels of management resources, which may divert our attention from other business operations.

We may fail to realize the anticipated benefits of recent acquisitions or such benefits may take longer to realize than expected, and we may encounter difficulty integrating these businesses into our operations. We may also be required to incur impairment and other charges, which would adversely affect our operating results.

In 2021 we completed the PMMA Acquisition and the Aristech Surfaces Acquisition, and in 2022 we completed the Heathland Acquisition. Our ability to realize the anticipated benefits of recent acquisitions will depend on our ability to successfully integrate the underlying businesses into ours. The Group has devoted significant attention and resources integrating the operations, systems, processes and procedures of the acquired businesses, and we expect to continue to do so. If we fail to effectively integrate, we could lose or diminish the expected benefits of these acquisitions. Further, this integration may not result in the realization of the cost and revenue synergies and benefits that we expected at the time of the acquisitions, nor can we give assurances that these benefits will be achieved when expected or at all.

We also face risks that we fail to meet our financial and strategic goals, due to, among other things, inability to grow the acquired business, achieve expected margins and grow relationships with customers. We may also be adversely affected by other economic, business, and/or competitive factors which did not exist at the time of closing. Such conditions could materially adversely impact our business and results of operations.

In connection with our acquisitions, applicable accounting standards require assets of an acquired business to be recorded on our consolidated balance sheet at their fair values as of the date of acquisition and any excess in the purchase price paid by us over the fair value of net tangible and intangible assets of any acquired business to be recorded as goodwill. We evaluate goodwill for impairment annually, in the fourth quarter, or more often if impairment indicators exist. We also review long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. If the fair value of one of our reporting units is less than its carrying value, or if as a result of a recoverability test we conclude that the projected discounted or undiscounted cash flows, as appropriate, are less than the carrying amount, we would record an impairment charge related to goodwill or long-lived assets, respectively. As a result of our fourth quarter 2022 impairment testing, we recorded an impairment charge of $297.1 million related to portions of the goodwill acquired in the PMMA Acquisition and Aristech Surfaces Acquisition. In the future, we may need to further reduce the carrying amount of goodwill and incur additional non-cash charges to our results of operations. Such charges could have the effect of reducing goodwill with a corresponding impairment expense and may have a material effect upon our reported results and financial condition. The additional expense may reduce our reported profitability or increase our reported losses in future periods and could negatively affect the value of our securities, our ability to obtain other sources of capital, and may generally have a negative effect on our future operations.

We may engage in other future strategic acquisitions or dispositions of certain assets and/or businesses that could affect our business, results of operations, financial condition and liquidity.

We may selectively pursue other complementary acquisitions and joint ventures, which inherently involves a number of risks and presents financial, managerial and operational challenges, including, but not limited to:

- potential disruption of our ongoing business and the distraction of our management;
- difficulty retaining key employees or with integration of personnel and financial and other systems;
- difficulty maintaining relationships with customers;
- hiring additional management and other critical personnel;
- generating expected cost savings and synergies from the acquisition; and
- increasing the scope, geographic diversity and complexity of our operations.

Also, the presence of one or more material liabilities of an acquired company that are unknown to us at the time of acquisition may have a material adverse effect on our business or financial results. Our acquisition and joint venture strategy may not be successfully received by customers or other stakeholders, and we may not realize any anticipated benefits from these other acquisitions or joint ventures.

We previously announced the Group's initiation of a formal process to divest our styrenics businesses, which we paused in 2022 and intend to restart when economic conditions improve. We may also opportunistically pursue dispositions of certain other assets and/or businesses, which may involve material amounts of assets or lines of business, and adversely affect our results of operations, financial condition and liquidity. If any such dispositions were to occur, under the terms of our senior secured credit agreement (the "Credit Agreement") governing our senior secured financing facility of up to $1,075.0 million (the "Senior Credit Facility") and the indentures governing our $500.0 million aggregate principal of 5.375% senior notes due 2025 (the "2025 Senior Notes"), and our $447.0 million aggregate principal of 5.125% senior notes due 2029 (the "2029 Senior Notes"), we may be required to apply the proceeds of the sale to repay any borrowings under our Senior Credit Facility, our 2025 Senior Notes or our 2029 Senior Notes. Dispositions may also involve continued financial involvement in the divested business, such as through continuing equity ownership, transition service agreements, supply agreements, guarantees, indemnities or other current or contingent financial obligations.

Joint ventures may not operate according to their business plans if we or our partners fail to fulfill our or their obligations, or differences in views among our joint venture partners result in delayed decisions, which may adversely affect our results of operations and may force us to dedicate additional resources to these joint ventures.

For the year ended December 31, 2022, we received dividends of $95.0 million from our Americas Styrenics joint venture. We may enter into additional joint ventures in the future. The nature of a joint venture requires us to share control with unaffiliated third parties. If joint venture partners do not fulfill their obligations, the affected joint venture may not be able to operate according to its business plan. In that case, our results of operations may be adversely affected and we may be required to increase the level of our commitment to the joint venture. Differences in views among joint venture participants and our inability to unilaterally implement sales and production strategies or determine cash distributions from joint ventures may significantly impact short-term and longer-term financial results, financial condition and the value of our ordinary shares.

We may be unable to achieve cost savings and other benefits from our restructuring activities and business excellence initiatives.

In 2019 we announced certain restructuring programs associated with our shift to a global functional structure, the adoption of our business excellence initiatives designed to create ongoing cost savings through business process optimization and efficiencies, and related more broadly to our overall transformation strategy, which programs are still ongoing. Our efforts to achieve these improvements and efficiencies may not be successful or generate expected cost savings, and we may incur greater costs than currently anticipated to implement and achieve these initiatives, which could have an adverse impact on our financial condition or results of operations. In December 2022, we also announced certain asset restructuring initiatives designed to reduce costs, improve profitability, reduce exposure to cyclical markets and elevated natural gas prices, and address market overcapacity. Implementation of these measures are dependent on the outcome of ongoing negotiations with works councils, industrial associations, and government authorities. We cannot guarantee that these initiatives will successfully generate the expected cost savings or will not require additional expenditures beyond our initial estimates. The actual timing and costs of this asset restructuring may differ from our expectations and estimates, and such differences may be material.

Risks Related to Regulation

We are subject to customs, international trade, export control, and antitrust laws that could require us to modify our current business practices and incur increased costs.

We are subject to numerous regulations, including customs and international trade laws, export/import control laws, and associated regulations. These laws and regulations limit the countries in which we can do business; the persons or entities with whom we can do business; the products which we can buy or sell; and the terms under which we can do business, including anti-dumping restrictions. In addition, we are subject to antitrust laws and zoning and occupancy laws that regulate manufacturers generally and/or govern the importation, promotion and sale of our products, the operation of factories and warehouse facilities and our relationship with our customers, suppliers and competitors. If any of these laws or regulations were to change or were violated by our management, employees, suppliers, buying agents or trading companies, the costs of certain goods could increase, or we could experience delays in shipments of our goods, be subject to fines or penalties, or suffer reputational harm, which could reduce demand for our products and hurt our business and negatively impact results of operations. In addition, in some areas we benefit from certain trade protections, including anti-dumping protection and the EU's Authorized Economic Operator program, which provides expedited customs treatment for materials crossing national borders. If we were to lose these protections, our results of operations could be adversely affected.

Global trade conflicts and the imposition of tariffs may have a material adverse impact on our business and results of operations.

Various governments have adopted new approaches to their trade policies seeking to renegotiate, or potentially terminate, certain existing bilateral or multi-lateral trade agreements and implement new tariff schedules. For example, the U.S. and China maintain certain trade policies and tariffs on imported products, which have resulted in shifting trade flows and increased costs for raw materials and finished goods. Uncertainty over global tariffs has and may continue to delay purchasing decisions by our customers as they assess the impact of such trade policies on their business. Further changes in trade policy, trade restrictions, tariffs, or other governmental action has the potential to adversely impact demand for our products or our customers' products, and our costs, including prices of raw materials, which in turn could adversely impact our business, financial condition and results of operations.

Regulatory and statutory changes applicable to our raw materials and products and our customers' products, including those related to climate change and sustainability, and consumer preferences could require material expenditures, changes in our operations and could adversely affect our financial condition and results of operations.

Changes in environmental, health and safety regulations in jurisdictions where we manufacture and sell our products could lead to a decrease in demand for our products. In addition to changes in regulations, customers, investors and other stakeholders are increasingly focusing on environmental issues and disclosures, including climate change, energy and water use, greenhouse gas emissions and other sustainability concerns. Change in public sentiment may result in changing demands for our products or could cause changes in the market dynamics of our existing products, impacting pricing, or cause us to incur additional costs to make changes to our operations to comply with such demand changes. Compliance with new regulations could increase the costs incurred to manufacture our products, or costs incurred by our customers to use our products and otherwise limit the use of these products and lead to decreased demand which would have an adverse effect on our business and results of operations. Our inability to meet investor, industry or stakeholder sustainability goals could materially impact our financial condition and results of operations.

Materials such as acrylonitrile, ethylbenzene, styrene, butadiene, BPA, MMA, and halogenated flame retardant are used in the manufacturing of our products and have come under scrutiny due to potentially significant or perceived health and safety concerns. Moreover, bans on single-use plastic and similar regulatory actions to reduce plastic waste and consumer preferences for sustainable and recyclable materials may reduce the demand for some of our products over time. New or proposed legislation addressing the global challenge of plastic waste may place responsibility on producers and sellers to include recycled content in their products, including the EU's proposed Ecodesign for Sustainable Product Regulation and California's recent Plastic Pollution Prevention and Packaging Producer Responsibility Act, while some countries, such as India and Canada, have banned single-use plastics entirely. This legislation may impact our sales and place more importance on our initiatives to further develop technologies for recycled products.

Additionally, these regulatory regimes currently require significant compliance expenditures and future regulatory changes applicable to our raw materials and products or our customers' products, could require significant additional expenditures or changes in our operations.

Our products are also used in a variety of end-uses that have specific regulatory requirements such as those relating to products that have contact with food or medical device end-uses. Our customers or distributors may not follow our policies and advice regarding the safe use and application of our products, which may unknowingly expose us to third-party claims. We and many of the applications for the products in the end markets in which we sell our products are regulated by various national and local rules, laws and regulations, such as the U.S. Toxic Substances Control Act and the EU's Registration, Evaluation, Authorisation and Restriction of Chemicals regulations. An increasing number of countries continue to adopt similar requirements, which could require significant compliance expenditures or changes to our sales and marketing strategies and operations. Changes to existing regulations could result in additional compliance costs, seizures, confiscations, recall or monetary fines, any of which could prevent or inhibit the development, distribution and sale of our products. Changes in environmental and safety laws and regulations banning or restricting the use of these residual materials in our products, or our customers' products, could adversely affect our results of operations and financial condition. Failure to appropriately manage safety, human health, product liability and environmental risks associated with our products, product life cycles and production processes could adversely impact employees, communities, stakeholders, our reputation and the results of our operations.

Compliance with extensive and evolving environmental, health and safety laws may require substantial expenditures.

We use large quantities of hazardous substances, generate hazardous wastes and emit wastewater and air pollutants in our manufacturing operations. Consequently, our operations are subject to extensive environmental, health and safety laws and regulations at both the national and local level in multiple jurisdictions. Many of these laws and regulations have become more stringent over time and the costs of compliance with these requirements may continue to increase, including costs associated with any capital investments for pollution control facilities. In addition, our production facilities and operations require operating permits, licenses or other approvals that may be subject to periodic renewal and, in circumstances of noncompliance, may be subject to revocation. The necessary licenses, permits or other approvals may not be issued or continue in effect, and any issued licenses, permits or approvals may contain more stringent limitations that restrict our operations or that require further expenditures to meet the permit requirements.

This continuing focus on climate change in jurisdictions in which we operate has and will continue to result in new environmental regulations that may require us to incur additional costs in complying with new regulatory and customer requirements, which may adversely impact our operations and financial condition. Compliance with more stringent environmental requirements would likely increase our costs of transportation and storage of raw materials and finished products, as well as the costs of storage and disposal of wastes. Additionally, we may incur substantial costs, including penalties, fines, damages, criminal or civil sanctions and remediation costs for the failure to comply with these laws or permit requirements.

We may be subject to losses due to liabilities or lawsuits related to contaminated land we own or operate or arising out of environmental damage or personal injuries associated with exposure to chemicals or the release of chemicals.

Under the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") and similar statutes outside the U.S., the current or former owner or operator of a property contaminated by hazardous substance releases is subject to strict, unlimited, joint, several and retroactive liability for the investigation and remediation of the property, and also may be liable for natural resource damages associated with the releases. In addition to potential statutory liability, we also face the risk that individuals could seek damages for personal injury due to exposure to chemicals at our facilities, chemicals which have been released from our facilities, chemicals otherwise owned or controlled by us, or chemicals which allegedly migrated from products containing our materials. We may be subject to claims with respect to workplace exposure, workers' compensation and other health and safety matters. Legal claims and regulatory actions could subject us to both civil and criminal penalties, which could affect our reputation as well as our results of operations, financial condition, and liquidity.

There are several properties which we own on which Dow has been conducting remediation to address historical contamination, while there are other properties with historical contamination that are owned by Dow that we lease for our operations. While we did not assume the liabilities associated with these properties in the U.S., because CERCLA and similar laws can impose liability for contamination on the current owner or operator of a property, even if it did not create the contamination, there is a possibility that a governmental authority or private party could seek to include us in an action or claim for remediation or damages, even though the contamination may have occurred prior to our ownership or occupancy. While Dow has agreed to indemnify us for liability for releases of hazardous materials that occurred prior to our separation from Dow, the indemnity is subject to monetary and temporal limitations. The period for new claims at these sites has expired. Later-acquired sites are subject to a different limitations period. We cannot be certain that Dow will fully honor the indemnity or that the indemnity will be sufficient to satisfy all claims that we may incur. Any active remedial projects on our properties which were part of the Dow Separation are being performed by Dow pursuant to its indemnification obligations. In addition, we face the risk that future claims might fall partially or fully outside of the scope of the indemnity, particularly if there is a release of hazardous materials that occurs in the future or at any time after our separation from Dow or if the condition requiring remediation is attributable to a combination of events or operations occurring prior to and after our separation from Dow. No material environmental claims have been asserted or threatened against the Group, and the Group is not a potentially responsible party for any material amounts at any Superfund Sites. The Group believes it has set adequate reserves for all remediation projects it is currently undertaking.

Risks Related to Our Indebtedness

Our current and future level of indebtedness of our subsidiaries could adversely affect our financial condition.

As of December 31, 2022, our indebtedness totaled approximately $2.3 billion. Additionally, as of December 31, 2022, we had $354.7 million (net of $20.3 million outstanding letters of credit) of funds available for borrowing under our Senior Credit Facility, as well as $150.0 million of funds available for borrowing under our accounts receivable securitization facility.

Our current level of indebtedness, as well as future borrowings or other indebtedness, could have significant consequences for our business, including but not limited to:

- increasing our vulnerability to economic downturns and adverse industry, competitive, or market conditions;
- requiring a substantial portion of our cash flows from operations to be dedicated to the payment of principal and interest on our indebtedness, therefore reducing our ability to use our cash flow to fund capital expenditures and future business opportunities and returning cash to our shareholders in the form of dividends or share repurchases;
- limiting our ability to obtain additional financing for working capital, capital expenditures, acquisitions, and general corporate or other purposes;
- compromising our flexibility to capitalize on business opportunities or other strategic acquisitions, and to react to competitive pressures, as compared to our competitors, or forcing us to make nonstrategic divestitures;
- placing us at a disadvantage compared to other, less leveraged competitors or competitors with comparable debt at more favorable interest rates; and
- increasing our cost of borrowing.

Although the terms of our senior secured credit agreement (the “Credit Agreement”) governing our Senior Credit Facility, and the indentures governing the 2029 Senior Notes and 2025 Senior Notes (the “Indentures”), contain restrictions on the incurrence of additional indebtedness, these restrictions are subject to a number of qualifications and exceptions and the indebtedness incurred in compliance with these restrictions could be substantial. Also, we are not prevented from incurring obligations that do not constitute “indebtedness” as defined in the Senior Credit Facility or the Indentures, such as operating leases and trade payables. If new debt is added to our subsidiaries’ current debt levels, the risks related to indebtedness that we now face could intensify.

In addition, a substantial portion of our subsidiaries’ current indebtedness is secured by substantially all of our assets, which may make it more difficult to secure additional borrowings at reasonable costs. If we default or declare bankruptcy, after these obligations are met, there may not be sufficient funds or assets to satisfy our subordinate interests, including those of our shareholders.

For more information regarding our indebtedness, please see *Liquidity and Capital Resources.*

The terms of our subsidiaries’ indebtedness may restrict our current and future operations, particularly our ability to respond to change or to take certain actions.

The Indentures and the Credit Agreement contain a number of covenants imposing certain restrictions on our subsidiaries’ businesses. These restrictions may affect our ability to operate our business and may limit our ability to take advantage of business opportunities. These agreements restrict, among other things, our subsidiaries’ ability to:

- sell or assign assets;
- incur additional indebtedness;
- pay dividends to Trinseo PLC;
- make investments or acquisitions;
- incur liens;
- repurchase or redeem capital shares;
- engage in mergers or consolidations;
- materially alter the business they conduct;

- engage in transactions with affiliates; and
- consolidate, merge or transfer all or substantially all of their assets.

Our Senior Credit Facility contains a financial covenant which requires us to meet a certain leverage ratio at the end of each financial quarter. If we are unable to comply with this covenant in future quarters, our ability to access our revolving credit facility will be limited to 30% of the total capacity of this revolver. The ability of our subsidiaries to comply with the covenants and financial ratios and tests contained in the Indentures and the Credit Agreement, to pay interest on indebtedness, fund working capital, and make anticipated capital expenditures depends on our future performance, which is subject to general economic conditions and other factors, some of which are beyond our control. There can be no assurance that our business will generate sufficient cash flow from operations or that future borrowings will be available under our Senior Credit Facility to fund liquidity needs in an amount sufficient to enable them to service their indebtedness. Furthermore, if we need additional capital for general corporate purposes or to execute on an expansion strategy, there can be no assurance that this capital will be available on satisfactory terms or at all.

A failure to repay amounts owed under the Senior Credit Facility, our 2029 Senior Notes or 2025 Senior Notes at maturity would result in a default. In addition, a breach of any of the covenants in the Credit Agreement or Indentures or our inability to comply with the required financial ratios or limits could result in a default. If a default occurs, lenders may refuse to lend us additional funds and the lenders or noteholders could declare all of the debt and any accrued interest and fees immediately due and payable. A default under one of our subsidiaries' debt agreements may trigger a cross-default under our other debt agreements. For more information regarding our indebtedness, please see *Liquidity and Capital Resources.*

Risks Related to Litigation

We are party to certain legal proceedings, and may be subject to additional litigation, arbitration or legal proceedings in the future.

From time to time, we may be involved in litigation, arbitration or other legal proceedings relating to claims arising out of our operations, business, including but not limited to disputes over prior transactions or service or maintenance costs at sites we do not own. The results of any current or future legal proceedings cannot be predicted with certainty and, regardless of the outcome, we may incur significant costs and experience a diversion of management resources as a result of such proceedings. The results of any such proceedings could have a material adverse impact on our business, financial condition, cash flows and results of operations.

The Group records accruals for legal matters which are both probable and estimable, and the Group believes that it has adequately accrued for ongoing legal matters as appropriate. Litigation and arbitration are inherently unpredictable and, although the Group believes that its accruals are adequate and/or that it has valid defenses in such matters, unfavorable resolutions could occur that are in excess of amounts accrued or which could have a material adverse effect on the Group's financial condition, results of operations or cash flows.

Risks Related to Our Relationship with Dow

Dow provides significant operating and other services, and certain raw materials used in the production of our products, under agreements that are important to our business. The failure of Dow to perform its obligations, or the termination of these agreements, could adversely affect our operations.

Prior to the Dow Separation, we were operated by Dow, which has provided and continues to provide services under certain agreements that are important to our business. We are a party to (i) SAR SSAs,; (ii) supply and sales agreements; and (iii) the AR MOD5 Agreement. Under the terms of the above agreements, either party is also permitted to terminate the applicable agreement in a variety of situations, including in the event of the other party's uncured material breach, insolvency, change of control or cessation of operations. Should Dow fail to provide these services or raw materials, or should any of the above agreements be terminated, we would be forced to obtain these services and raw materials from third parties or provide them ourselves. Additionally, if Dow terminates agreements pursuant to which we are obligated to provide certain services, we may lose the fees received by us under these agreements. The failure of Dow to perform its obligations under, or our inability to renegotiate, renew or replace any of these contracts, particularly without an alternative source of raw materials, could adversely affect our operations. Depending on market conditions at the time of any such termination, we may not be able to enter into substitute arrangements in a timely manner, on terms as favorable to us or at all. For more information regarding our relationship with Dow, please see *Our Relationship with Dow*.

We are party to certain license agreements with Dow relating to intellectual property that is essential to our business. Because of this relationship, we may have limited ability to expand our use of certain intellectual property beyond the field of the license or to police infringement that may be harmful to our business.

In connection with the Dow Separation, we acquired ownership of, or in some cases, a worldwide right and license to use, certain patents, patent applications and other intellectual property of Dow that were used by Dow to operate our business segments or held by Dow primarily for the benefit of our business segments, prior to the Dow Separation. Generally, we acquired ownership of the intellectual property that was primarily used in our business segments and acquired a license to a more limited set of intellectual property that had broader application within Dow beyond our core business segments. Our license from Dow is perpetual, irrevocable, fully paid, and royalty-free. Furthermore, our license from Dow is exclusive within our business segments for certain patents and patent applications that were used by Dow primarily prior to our separation, subject to licenses previously granted by Dow, and to certain retained rights of Dow, including Dow's retained right to use patents and patent applications outside of our business segments and for internal consumption by Dow. Our license from Dow relates to polymeric compositions, manufacturing processes and end applications for the polymeric compositions; and is limited to use in defined areas corresponding to our current business segments excluding certain products and end-use application technology retained by Dow. Our ability to develop, manufacture or sell products and technology outside of these defined areas may be impeded by the intellectual property rights that have been retained by Dow, which could adversely affect our business, financial condition and results of operations. Additionally, infringement on these intellectual property rights could also impact our business and competitive position. We may not be able to enforce our rights, and Dow may be unwilling to enforce its rights, with respect to this intellectual property that has been licensed by Dow.

Risks Related to Our Intellectual Property

Our business relies on intellectual property and other proprietary information and our failure to adequately protect or effectively enforce our rights could harm our competitive advantages with respect to the manufacturing of some of our products.

Our success depends to a significant degree upon our ability to protect, preserve and enforce our intellectual property rights, including patents, trademarks, licenses, trade secrets and other proprietary information of our business. However, we may be unable to prevent third parties from using our intellectual property and other proprietary information without our authorization or independently developing intellectual property and other proprietary information that is similar to or competes with ours. Any inability by us to effectively prevent the unauthorized use of our intellectual property and other proprietary information by others could reduce or eliminate any competitive advantage we have developed, cause us to lose sales or otherwise harm our business or goodwill. If it becomes necessary for us to initiate litigation to protect our proprietary rights, any proceedings could be burdensome and costly, and we may not prevail.

We may be unable to determine when third parties are using our intellectual property rights without our authorization, particularly our manufacturing processes. In addition, we cannot be certain that any intellectual property rights that we have licensed to third parties are being used only as authorized by the applicable license agreement. The undetected, unremedied, or unauthorized use of our intellectual property rights or the legitimate development or acquisition of intellectual property that is similar to or competes with ours by third parties could reduce or eliminate the competitive advantage we have as a result of our intellectual property, adversely affecting our financial condition and results of operations.

If we fail to adequately protect our intellectual property and other proprietary information, including our processes, apparatuses, technology, trade secrets, trade names and proprietary manufacturing know how, methods and compounds, through obtaining patent protection, securing trademark registrations and securing our trade secrets through the use of confidentiality agreements of appropriate scope and other means, our competitive advantages over other producers could be materially adversely affected. If we determine to take legal action to protect, defend or enforce our intellectual property rights, any suits or proceedings could result in significant costs and diversion of our resources and our management's attention. We may not prevail in any such suits or proceedings. A failure to protect, defend or enforce our intellectual property rights could have an adverse effect on our financial condition and results of operations.

Our products may infringe the intellectual property rights of others, which may cause us to incur unexpected costs or prevent us from selling our products.

Many of our competitors have a substantial amount of intellectual property that we must continually strive to avoid infringing as we improve our own business processes and develop new products and applications. Although it is our policy and intention not to infringe valid patents of which we are aware, we cannot provide assurances that our processes and products and other activities do not and will not infringe issued patents (whether present or future) or other intellectual property rights belonging to others. There nonetheless could be third-party patents that cover our products, processes or technologies, and it is possible that we could be liable for infringement of such patents and could be required to take remedial or curative actions to continue our manufacturing and sales activities with respect to one or more products that are found to be infringing. We may also be subject to indemnity claims by our business partners arising out of claims of their alleged infringement of the patents, trademarks and other intellectual property rights of third parties in connection with their use of our products. Intellectual property litigation often is expensive and time-consuming, regardless of the merits of any claim, and our involvement in such litigation could divert our management's attention from operating our business. If we were to discover that any of our processes, technologies or products infringe on the valid intellectual property rights of others, we may not be able to obtain the necessary licenses on acceptable terms, or at all, or be able to modify our processes or technologies or re-engineer our products in a manner that is successful in avoiding infringement. Moreover, if we are sued for infringement and lose, we could be required to pay substantial damages and/or be enjoined from using or selling the infringing products or technology. Any of the foregoing could cause us to incur significant costs and prevent us from selling our products and could have an adverse effect on our financial condition and results of operations.

Risks Related to Data Security

Data security breaches could compromise sensitive information related to our business or the private information of our employees, vendors, and customers, which could adversely affect our business and our reputation.

Cyber-attacks or data security breaches could compromise confidential, private, business critical information or cause a failure in our computer or operating systems that may disrupt our operations. We have attractive information assets, including intellectual property, trade secrets and other sensitive, business critical information. We continue to face risk of attack from outside our organization (including cyberattacks by criminal groups, state-sponsored actors or social-activist (hacktivist) organizations) using sophisticated technical and non-technical methodologies such as social engineering and phishing attacks. Cyber threats are constantly evolving, becoming more sophisticated and being made by groups and individuals with a wide range of expertise and motives, and this increases the difficulty of detecting and successfully defending against them. We also face risks from internal threats to information security, such as from negligent or dishonest employees or consultants. A successful cyber-attack or other breach of security could result in the loss of critical business information and/or could negatively impact operations, which could have a negative impact on our financial results. Furthermore, in addition to using our own systems and infrastructure, we use information systems and infrastructure operated by third-party service providers. If our third-party service providers experience an information security breach, depending on the nature of the breach, it could compromise confidential, business critical information or cause a disruption in our operations. In addition, the loss or disclosure of sensitive or private information about our employees, vendors, or customers as a result of such a breach may result in violations of various data privacy regulations and expose us to litigation, fines and other penalties. Therefore, any such disruptions to our operations or violations of data privacy laws could negatively impact our reputation and results of operations.

Risks Related to our Information Systems

The implementation of a new enterprise resource planning system could cause disruption to our operations.

We are currently in the process of a multi-year transition to a new enterprise resource planning ("ERP") system, which will replace most of our core financial systems, and which is expected to occur in phases over the next several years. If the implementation of the ERP system does not proceed as expected, it could impede our ability to accurately maintain financial records and share financial data across the Group. Failure to successfully implement the ERP system as planned, or if the ERP system does not operate as intended, could negatively impact the effectiveness of our internal control over financial reporting. Any of these types of disruptions could have a negative effect on our business, operating results, and financial condition. In addition, implementing a new ERP system may require significant resources and refinement to fully realize the expected benefits of the system.

Risks Related to Our Ordinary Shares

Irish law differs from the laws in effect in the U.S. and may afford less protection to holders of our securities than U.S. companies.

It may not be possible to enforce court judgments obtained in the U.S. against us in Ireland based on the civil liability provisions of the U.S. federal or state securities laws. In addition, there is some uncertainty as to whether the courts of Ireland would recognize or enforce judgments of U.S. courts obtained against us or our directors or officers based on the civil liabilities provisions of the U.S. federal or state securities laws or hear actions against us or those persons based on those laws. There is no treaty between Ireland and the U.S. providing for the reciprocal enforcement of foreign judgments. Therefore, a final judgment for the payment of money rendered by any U.S. federal or state court based on civil liability, whether or not based solely on U.S. federal or state securities laws, would not automatically be enforceable in Ireland.

As an Irish company, Trinseo is governed by the Irish Companies Acts, which differ in some material respects from laws generally applicable to U.S. corporations and shareholders, including, among others, differences relating to interested director and officer transactions and shareholder lawsuits. Likewise, the duties of directors and officers of an Irish company generally are owed to the Group only. Shareholders of Irish companies generally do not have a personal right of action against directors or officers of the Group and may exercise such rights of action on behalf of the Group only in limited circumstances. Accordingly, holders of our shares may have more difficulty protecting their interests than would holders of securities of a corporation incorporated in a jurisdiction of the U.S.

Provisions of our articles of association and Irish law could delay or prevent a takeover of us by a third party.

Our articles of association could delay, defer or prevent a third-party from acquiring us, despite the possible benefit to our shareholders. For example, our articles of association impose advance notice requirements for shareholder proposals and nominations of directors to be considered at shareholder meetings, and our articles also require supermajority approval from shareholders to amend or repeal our articles of association.

In addition, several mandatory provisions of Irish law could prevent or delay an acquisition of Trinseo. For example, Irish law does not permit shareholders of an Irish public limited company to take action by written consent with less than unanimous consent. We are also subject to provisions of Irish law relating to mandatory bids, voluntary bids, requirements to make a cash offer and minimum price requirements, as well as rules requiring the disclosure of interests in our ordinary shares in certain circumstances.

These provisions may discourage potential takeover attempts, discourage bids for our ordinary shares at a premium over the market price, and may negatively impact the voting and other rights of our shareholders. These provisions could also discourage proxy contests and make it more difficult for our shareholders to elect directors other than those nominated by our board of directors.

Any attempts to take us over will be subject to Irish Takeover Rules and subject to review by the Irish Takeover Panel.

We are subject to the Irish Takeover Rules, under which our board of directors will not be permitted to take any action which might frustrate an offer for our ordinary shares once it has received an approach which may lead to an offer or has reason to believe an offer is imminent.

As an Irish public limited company, certain capital structure decisions regarding the Group will require the approval of shareholders, which may limit the Group’s flexibility to manage its capital structure.

Irish law provides that a board of directors may allot shares (or rights to subscribe for or convertible into shares) only with the prior authorization of shareholders, for a maximum period of five years, as specified in the articles of association or relevant shareholder resolution. At our 2022 annual general meeting, shareholders authorized the allotment of up to 33% of the nominal value of the Group's issued ordinary share capital as of March 31, 2022 for a period of 18 months. Approval from the Group's shareholders, by ordinary resolution, being a resolution passed by a simple majority of votes cast, on or prior to expiration, will be required to renew this authorization. Our ability to issue equity without this authorization could be limited which could adversely affect our securities holders.

Irish law also generally provides shareholders with preemptive rights when new shares are issued for cash; however, it is possible for the Group's articles of association, or shareholders in general meeting, to exclude preemptive rights. At our 2022 annual general meeting, shareholders authorized the exclusion of preemptive rights for a period of 18 months for (i) the issuance of shares for cash in connection with any rights issue; and (ii) the issuance of shares for cash not to exceed 5% of our issued ordinary share capital as of March 31, 2022 (with an additional 5% provided the Group uses it for an acquisition or specified capital investment). Renewal of this exclusion requires approval by Company's shareholders, by special resolution, being a resolution passed by not less than 75% of votes cast, on or prior to expiration. Should this exclusion not be approved, our ability to issue equity could be limited which could adversely affect our securities holders.

General Risks

Conditions in the global economy and capital markets may adversely affect our results of operations, financial condition and cash flows.

Our products are sold in markets that are sensitive to changes in general economic conditions, such as sales of automotive and construction products. Downturns in general economic conditions can cause fluctuations in demand for our products, product prices, volumes and margins.

Rising inflation and interest rates, turbulence in the credit markets, fluctuating commodity prices, volatile exchange rates and other challenges affecting the global economy can affect us and our customers. Instability and uncertainty in financial and commodity markets throughout the world may cause, among other things, severely diminished liquidity and credit availability, rating downgrades of certain investments and declining valuations and pricing volatility of others, volatile energy and raw material costs, geopolitical issues and failure and the potential failure of major financial institutions. Adverse events affecting the health of the economy, including recessionary conditions, sovereign debt and economic crises, refugee crises, disease pandemics, terrorism, protectionism, tariffs, and the threat of war, could have a negative impact on the health of the global economy. These developments, or the perception that any of them could occur, may have a material adverse effect on global economic conditions or on the stability of global financial markets. During any period of uncertainty or heightened market volatility, consumer confidence may decline which could lead to a decline in demand for our products or a shift to lower-margin products, which could adversely affect sales of our products and our profitability and could also result in impairments of certain of our assets.

Deterioration in the financial and credit market heightens the risk of customer bankruptcies and delay in payment. We are unable to predict the duration of the current economic conditions or their effects on financial markets, our business and results of operations. If economic conditions deteriorate, our results of operations, financial condition and cash flows could be materially adversely affected.

As a global business, we are exposed to local business risks in different countries, which could have a material adverse effect on our financial condition or results of operations.

We have significant operations worldwide, including manufacturing facilities, R&D facilities, sales personnel and customer support operations. As of December 31, 2022, we operated, or others operated on our behalf, 39 manufacturing plants and one recycling facility at 33 sites around the world. Our international operations are subject to risks inherent in doing business in foreign countries, including, but not necessarily limited to:

- new and different legal and regulatory requirements in local jurisdictions, or changes to rules and regulations with minimal advance notice;
- uncertainties regarding interpretation and enforcement of laws and regulations;
- variation in political and economic policy of the local governments and social conditions;
- tariffs, export duties, or import quotas;
- domestic and foreign customs and tariffs or other trade barriers;

- restrictive labor and employment laws;
- potential staffing difficulties and labor disputes;
- managing and obtaining support and distribution for local operations;
- increased costs of transportation or shipping;
- credit risk and financial conditions of local customers and distributors;
- potential difficulties in protecting intellectual property;
- risk of nationalization of private enterprises by foreign governments;
- potential imposition of restrictions on investments;
- potentially adverse tax consequences, including imposition or increase of withholding and other taxes on remittances and other payments by subsidiaries;
- legal restrictions on doing business in or with certain nations, certain parties and/or certain products;
- foreign currency exchange restrictions and fluctuations; and
- local economic, political and social conditions, including the possibility of hyperinflationary conditions and political instability.

We may not be successful in developing and implementing policies and strategies to address the foregoing factors in a timely and effective manner at each location where we do business. Consequently, the occurrence of one or more of the foregoing factors could have a material adverse effect on our international operations or upon our financial condition and results of operations.

Our operations in developing markets could expose us to political, economic and regulatory risks that are greater than those we may face in established markets. For example, we operate in some nations that have experienced significant levels of governmental corruption. Any failure by us to ensure that our employees and agents comply with applicable laws and regulations in foreign jurisdictions could result in substantial civil and criminal penalties or restrictions on our ability to conduct business in certain foreign jurisdictions or reputational damage, and our results of operations and financial condition could be materially and adversely affected.

Fluctuations in currency exchange rates may significantly impact our results of operations and may significantly affect the comparability of our results between financial periods.

Our operations are conducted by subsidiaries in many countries. The results of the operations and the financial position of these subsidiaries are reported in the relevant foreign currencies and then translated into U.S. dollars at the applicable exchange rates for inclusion in our consolidated financial statements. The main currency to which we are exposed is the euro, as approximately 54% of our net sales were generated in Europe in 2022. To a lesser degree, we are also exposed to other currencies, including, among others, the Chinese yuan, South Korean won, Swiss franc, and New Taiwan dollar. The exchange rates between these currencies and the U.S. dollar have fluctuated significantly in recent years and may continue to do so in the future. A depreciation of these currencies against the U.S. dollar, in particular the euro, will decrease the U.S. dollar equivalent of the amounts derived from these operations reported in our consolidated financial statements and an appreciation of these currencies will result in a corresponding increase in such amounts. Because some of our raw material costs are procured in U.S. dollars rather than on these currencies, depreciation of these currencies may have an adverse effect on our profit margins or our reported results of operations. Conversely, to the extent that we are required to pay for goods or services in foreign currencies, the appreciation of such currencies against the U.S. dollar will tend to negatively impact our results of operations. In addition, currency fluctuations may affect the comparability of our results of operations between financial periods.

We incur currency translation risk whenever we enter into either a purchase or sale transaction using a currency other than the local currency of the transacting entity. From time to time, we enter into foreign exchange forward contracts to hedge fluctuations associated with certain monetary assets and liabilities, primarily accounts receivable, accounts payable and certain intercompany obligations. However, attempts to hedge against foreign currency fluctuation risk may not be able to effectively limit our exposure to intermediate or long-term movements in currency exchange rates, which could adversely impact our financial condition or results of operations. Given the volatility of exchange rates, there can be no assurance that we will be able to effectively manage our currency translation risks or that any volatility in currency exchange rates will not have a material adverse effect on our financial condition or results of operations.

The extent to which the COVID-19 pandemic will continue to impact our business, financial condition and results of operations could be material.

The COVID-19 pandemic has created significant worldwide social and economic volatility and weakened economic conditions in the countries in which we operate. While the initial impact from the pandemic to our business has stabilized, we continue to experience operational disruptions and the extent to which COVID-19 may continue to adversely impact our business, liquidity, financial condition and results of operations, depends on numerous factors including the number of new infections or new variants, or renewed travel restrictions or lockdowns. Other effects such as increased costs or disruption in the availability of raw materials and feedstocks, increased energy prices, increased freight or transportation costs, global price inflation, the health and safety of our employees, plant closures, supply chain disruption, and the impact on economic activity generally, including a global or national recession, could negatively impact our business and results of operations. Business disruptions relating to the pandemic, including the impact of new variants or an increased spread of infections could negatively impact our outlook, share price, or the economies in the countries in which we operate, which would adversely impact our business and results of operations.

Legal Proceedings

From time to time we may be subject to various legal claims and proceedings incidental to the normal conduct of business, relating to such matters as product liability, antitrust, competition, waste disposal practices, release of chemicals into the environment, current and former employees, and other matters that may arise in the ordinary course of our business. We currently believe that there is no litigation pending that is likely to have a material adverse effect on our business. Regardless of the outcome, legal proceedings can have an adverse impact on us because of defense and settlement costs, diversion of management resources and other factors.

Synthos Matter

On November 21, 2022, the Group received formal notice from the German Arbitration Institute that Synthos S.A., including certain of its affiliates (collectively, “Synthos”), had initiated an arbitration dispute on October 14, 2022 against Trinseo and its following subsidiaries: Trinseo Deutschland GmbH, Trinseo Belgium BV, Trinseo Europe GmbH, and Trinseo Export GmbH, related to Synthos’ purchase of Trinseo’s Rubber Business in 2021.

Synthos and Trinseo are parties to an asset purchase agreement (“APA”) dated May 21, 2021, whereby Trinseo transferred its Rubber Business to Synthos, pending regulatory approval and other administrative pre-closing conditions, for an enterprise value of approximately $491.0 million. This transaction formally closed on December 1, 2021. Synthos claims that Trinseo did not properly disclose certain information including the natural gas pricing mechanism for the steam which is supplied by a third party to the Rubber Business. Synthos is seeking non-monetary restitution and monetary damages related to the spike of utility prices in Germany that commenced in the fall of 2021.

The Group believes it has valid and prevailing defenses to Synthos’ claims and intends to vigorously defend itself against all allegations.

Legal Proceedings related to the Bristol Spill

On March 24, 2023, due to equipment failure at the Bristol, Pennsylvania facility, operated by our wholly-owned subsidiary, Altuglas LLC, an accidental release of a latex emulsion product occurred, which ultimately flowed into a local waterway (the “Bristol Spill”). We reported the event and cooperated closely with local, state, and federal authorities on the response activities. Water sampling conducted by the authorities did not detect site-related material in the waterway.

(a) Jonnie Helfrich v. Trinseo PLC (No. 2:23-cv-01525) (United States District Court for the Eastern District of Pennsylvania)

On April 20, 2023, a complaint was filed which purports to be on behalf of a class of purchasers of the Company’s securities between May 3, 2021 and March 27, 2023. It names as defendants the Company and our chief executive officer and chief financial officer, and seeks unspecified damages and other relief for alleged violations of Sections 10(b) and 20(a) of, and Rule 10b-5 under, of the Securities Exchange Act of 1934. Given the early stage of this matter, we are not able to estimate whether a material loss to our business is probable or remote, or estimate a potential range of loss, if any. The Group intends to vigorously defend this action.

(b) Timothy McGraw, Emily Cohen & Danielle Byrd v. Altuglas LLC and Trinseo LLC (Court of Common Pleas of Philadelphia County)

On March 29, 2023, a putative class action complaint was filed which seeks to certify a class that could potentially include all persons and entities that reside in the area served by the Baxter Drinking Water Treatment Plant. The plaintiffs allege claims of breach of duty of care based on negligence as a result of the Bristol Spill, as well as other causes of action, and seek compensatory damages, restitution, or refund of damages, including actual, statutory, and punitive damages, as well as injunctive relief. Given the early stage of this matter, we are not able to estimate whether a material loss to our business is probable or remote, or estimate a potential range of loss, if any. The Group intends to vigorously defend this action.

(c) Environmental Proceedings

On March 25, 2023, the Group received a Notice of Federal Interest from the United States Coast Guard ("USCG"), identifying the Company as a "potentially responsible party" ("PRP") related to the Bristol Spill. The Group also received a Notice of Federal Assumption and an Administrative Order, dated April 20, 2023 from the USCG, identifying the Company as a PRP related to the Bristol Spill. The USCG notices and order do not designate specific fines or penalties against the Group. It is not possible at this time for the Group to estimate its ultimate liability pursuant to the USCG notices or order, or other potential administrative actions related to the Bristol Spill, whether a material loss to our business is probable or remote, or estimate a potential range of loss, if any.

Market Risk

We are exposed to changes in interest rates and foreign currency exchange rates because we finance certain operations through fixed and variable rate debt instruments and denominate our transactions in a variety of foreign currencies. We are also exposed to changes in the prices of certain commodities that we use in production. Changes in these rates and commodity prices may have an impact on future cash flows and earnings. We manage these risks through normal operating and financing activities and, when deemed appropriate, through the use of derivative financial instruments. We do not enter into financial instruments for trading or speculative purposes.

By using derivative instruments, we are subject to credit and market risk. The fair market value of the derivative instruments is determined by using valuation models whose inputs are derived using market observable inputs, including interest rate yield curves, as well as foreign exchange and commodity spot and forward rates, and reflects the asset or liability position as of the end of each reporting period. When the fair value of a derivative contract is positive, the counterparty owes us, thus creating a receivable risk for us. We are exposed to counterparty credit risk in the event of non-performance by counterparties to our derivative agreements. We minimize counterparty credit (or repayment) risk by entering into transactions with various major financial institutions of investment grade credit rating.

Our exposure to market risk is not hedged in a manner that completely eliminates the effects of changing market conditions on earnings or cash flows.

Interest Rate Risk

Given the Group's debt structure, we have certain exposure to changes in interest rates. Refer to Note 12 in the consolidated financial statements for further information regarding the Group's debt facilities.

The Group's 2028 Term Loan B bears an interest rate of LIBOR plus 2.50% (subject to a 0.00% LIBOR floor) and is not party to an interest rate swap agreement. The Group's 2024 Term Loan B bears an interest rate of LIBOR plus 2.00% (subject to a 0.00% LIBOR floor) as of December 31, 2022. In order to reduce the variability in interest payments associated with our variable rate debt, the Group entered into an interest rate swap agreement on our 2024 Term Loan B that converts a portion of this variable rate borrowing into a fixed rate obligation. This interest rate swap agreement was designated as a cash flow hedge, and as such, the contract is marked-to-market at each reporting date and any unrealized gains or losses are included in AOCI to the extent effective and reclassified to interest expense in the period during which the transaction effects earnings or it becomes probable that the forecasted transaction will not occur. The interest rate swap agreement matured in September 2022, and the Group has no remaining open interest rate swap agreements as of December 31, 2022, and as such, the Group is exposed to rising interest rate risk.

Based on weighted average outstanding borrowings under the 2028 Term Loan B and 2024 Term Loan B for the year ended December 31, 2022, an increase in 100 basis points in LIBOR would have resulted in approximately $14.7 million of additional interest expense for the period, inclusive of the impact of the interest rate swap agreements discussed above.

Loans under the 2026 Revolving Facility, at the Borrowers' option, may be maintained as (a) LIBOR loans, which bear interest at a rate per annum equal to LIBOR plus the applicable margin (as defined in the Credit Agreement), if applicable, or (b) base rate loans which shall bear interest at a rate per annum equal to the base rate plus the applicable margin (as defined in the Credit Agreement). As of December 31, 2022, the Borrowers are required to pay a quarterly commitment fee in respect of any unused commitments under the 2026 Revolving Facility equal to 0.375% per annum. As of and for the year ended December 31, 2022, we had no variable rate debt issued under our 2026 Revolving Facility.

Our Accounts Receivable Securitization Facility is subject to interest charges on both the amount of outstanding borrowings as well as the amount of available, but undrawn commitments under the facility. As of December 31, 2022, the Accounts Receivable Securitization Facility incurs fixed interest charges of 1.65% on outstanding borrowings plus variable commercial paper rates which vary by month and by currency, as outstanding balances can be denominated in euros and U.S. dollars, as well as fixed charges of 0.80% on available, but undrawn commitments. As of and throughout the year ended December 31, 2022, we had no variable debt issued under our Accounts Receivable Securitization Facility, and as such, we incurred no variable rate interest related to this facility during the period.

Foreign Currency Risks

The Group's ongoing business operations expose us to foreign currency risks, including fluctuating foreign exchange rates. Our primary foreign currency exposure is the euro-to-U.S. dollar exchange rate, noting that approximately 54% of our net sales were generated in Europe for the year ended December 31, 2022. To a lesser degree, we are also exposed to the exchange rates between the U.S. dollar and other currencies, including, among others, the Chinese yuan, South Korean won, Swiss franc, and New Taiwan dollar. To manage these risks, the Group periodically enters into derivative financial instruments such as foreign exchange forward contracts.

Certain subsidiaries have monetary assets and liabilities denominated in currencies other than their respective functional currencies, which creates foreign exchange risk. Our principal strategy in managing exposure to changes in foreign currency exchange rates is to naturally hedge the foreign currency-denominated liabilities on our consolidated balance sheets against corresponding assets of the same currency such that any changes in liabilities due to fluctuations in exchange rates are offset by changes in their corresponding foreign currency assets. In order to further reduce our exposure, we use foreign exchange forward contracts to economically hedge the impact of the variability in exchange rates on our monetary assets and liabilities denominated in certain foreign currencies. These derivative contracts are not designated for hedge accounting treatment.

The Group also enters into forward contracts with the objective of managing the currency risk associated with forecasted U.S. dollar-denominated raw materials purchases by one of our subsidiaries whose functional currency is the euro. By entering into these forward contracts, which are designated as cash flow hedges, the Group buys a designated amount of U.S. dollars and sells euros at the prevailing market rate to mitigate the risk associated with the fluctuations in the euro-to-U.S. dollar foreign currency exchange rate. The qualifying hedge contracts are marked-to-market at each reporting date and any unrealized gains or losses are included in AOCI to the extent effective, and reclassified to cost of sales in the period during which the transaction affects earnings or it becomes probable that the forecasted transaction will not occur. As of December 31, 2022, the Group does not have any outstanding forward contracts for the purposes of hedging its exposure to the euro. The Group continues to monitor prevailing rate forecasts and its euro-denominated exposure to determine when to enter into these forward contracts under favorable conditions. A 1% change in the euro will impact our annual profitability by approximately $1.7 million on a pre-tax basis.

We have legal entities consolidated in our financial statements that have functional currencies other than the U.S. dollar, our reporting currency. As a result of currencies fluctuating against the U.S. dollar, currency translation gains and losses are recorded in other comprehensive income, primarily as a result of the remeasurement of our euro functional legal entities as of December 31, 2022 and 2021.

Raw Material Price Risk

We purchase certain raw materials such as benzene, ethylene, butadiene, BPA, styrene, MMA, and acetone primarily under short- and long-term supply contracts. The pricing terms for these raw material purchases are generally determined based on commodity indices and prevailing market conditions within the relevant geography. The selling prices of our products are generally based, in part, on the current or forecasted costs of our key raw materials, but are often subject to a predetermined lag period for the pass through of these costs. As such, during periods of significant raw material price volatility, the Group may experience material volatility in earnings and cash flows due to the lag in passing through raw material costs, primarily for benzene, ethylene, butadiene, styrene, MMA, and acetone. Assuming no changes in sales price, volume or mix, a hypothetical 10% change in the market price of our raw materials would have impacted cost of sales by approximately $343.9 million for the year ended December 31, 2022.

We mitigate the risk of volatility in raw material prices where possible by passing changes in raw material costs through to our customers by adjusting our prices or including provisions in our contracts that allow us to adjust prices in such a circumstance or by including pricing formulas which utilize commodity indices. Nevertheless, we may be subject to the timing differences described above for the pass through of these costs. In addition, even when raw material costs may be passed on to our customers, during periods of high raw material price volatility, customers without minimum purchase requirements with us may choose to delay purchases of our materials or, in some cases, substitute purchases of our materials with less costly products. We do not currently enter into derivative financial instruments to manage our price risk relating to our raw material contracts.

Commodity Price Risk

We purchase certain commodities, primarily natural gas, to operate facilities and generate heat and steam for various manufacturing processes, which purchases are subject to price volatility, generally based on commodity indices and prevailing market conditions within the relevant geography. In certain instances, the selling prices of our products are based, in part, on the current or forecasted costs of our key commodities, but are subject to a predetermined lag period for the pass through of these costs. As such, during periods of significant commodity price volatility, the Group may experience material volatility in earnings and cash flows due to the lag in or inability to pass through these commodity costs. Such a period arose in 2022, where the challenging operating conditions, including the ongoing war in Ukraine and the corresponding sanctions and other measures being imposed by various governments impacted global markets, particularly in Europe, lead to high volatility and increased prices for natural gas and other energy supplies.

We mitigate the risk of price fluctuations associated with these commodity purchases where possible by passing changes in commodity costs through to our customers by adjusting our prices or including provisions in our contracts that allow us to adjust prices in such a circumstance or by including pricing formulas which utilize commodity indices. Additionally, as deemed appropriate, we may enter into derivative financial instruments such as commodity swaps, which effectively converts a portion of our natural gas costs into a fixed rate obligation. Certain of these commodity swap agreements are designated as cash flow hedges, and as such, the contracts are marked-to-market at each reporting date and any unrealized gains or losses are included in AOCI to the extent effective, and reclassified to cost of sales in the period during which the transaction affects earnings or it becomes probable that the forecasted transaction will not occur. We may also enter into commodity swap agreements to economically hedge the impact of these price fluctuations, which are not designated for hedge accounting treatment. Inclusive of these hedges, a hypothetical 10% increase in natural gas prices will impact cost of sales by approximately $15.5 million.

2022 Highlights

For the year ended December 31, 2022, we had net loss from continuing operations of $392.0 million, inclusive of a non-cash goodwill impairment charge of $297.1 million as discussed below, and Adjusted EBITDA of $311.5 million. Our year-to-date results were significantly impacted by the challenging operating conditions experienced throughout the year, including the uncertain geopolitical situation, historically high natural gas and energy prices, continued COVID-19 lockdowns in China, and a rapid rise in interest rates in an inflationary environment. These factors constrained margins and led to weaker demand and significant customer destocking in the second half of the year, which was exacerbated by steep fluctuations in many raw material prices throughout the year, as well as extended year-end shutdowns at many customer sites. The challenging operating conditions noted above had a significant impact on the PMMA business and Aristech Surfaces, which led to lower operating results including slower growth projections as well as a prolonged drop in market capitalization. As a result, we recognized a non-cash impairment charge of $297.1 million related to these reporting unit's goodwill balances. These impairment charges do not affect the Group's cash position, and the Group remains encouraged about the businesses' expected synergies and strategic value as we continue to evolve as a specialty material and sustainable solutions provider. Refer to the discussion below for further information and refer to *Non-GAAP Performance Measures* for discussion of our use of non-GAAP measures in evaluating our performance and a reconciliation of these measures.

Amid these uncertain market conditions, the Group implemented liquidity-focused actions, including reduced capital spending, operating expenses and working capital. Additionally, the Group returned significant cash to our shareholders, purchasing approximately 3.1 million ordinary shares for total value of $150.0 million and declaring quarterly dividends for an aggregate value of $1.28 per ordinary share, or $46.4 million. The Group continues to achieve positive cash generation from operating activities and maintains access to capital resources that affords us with financial flexibility. Further, there are no maintenance covenants on our debt agreements, and no significant debt maturing until September 2024. Refer to *Liquidity and Capital Resources* for further information. Highlights for the year are described below.

Asset Restructuring Plan

In response to the challenging macroeconomic conditions noted above, during the fourth quarter of 2022, Trinseo approved an asset restructuring plan to improve its economic position, operating flexibility, and reduce its exposure to cyclical commodity markets. These actions consist of the following:

- Closure of manufacturing operations at the styrene production facility in Boehlen, Germany. The closure is the result of an uncompetitive position in the global styrene market due to the site's subscale size, industry capacity additions and elevated natural gas prices in Europe.
- Closure of one polycarbonate production line in Stade, Germany due to an uncompetitive position in the global polycarbonate market. The Group will continue to produce polycarbonate for use in its downstream compounding business with the remaining assets. The line closure is expected to result in lower costs and significantly less exposure to the cyclical merchant polycarbonate market.
- Consolidation of the PMMA sheet manufacturing site in Matamoros, Mexico into the continuous sheet manufacturing operation of Aristech Surfaces in Florence, Kentucky.
- Capacity reduction of SB latex at the Hamina, Finland site starting mid-year 2023 due to over-capacity of SB latex in Europe.

These actions are expected to be substantially completed by the end of 2024. Total charges of $56.7 million were incurred during the year ended December 31, 2022 related to this restructuring. Refer to Note 21 in the consolidated financial statements for more information.

European Commission Request for Information

In 2018, Trinseo received a request for information from the European Commission Directorate General for Competition (the "European Commission") related to styrene monomer commercial activity in the European Economic Area, as well as subsequent requests for information. As a result of further developments in this matter, the Group recorded a charge of $36.2 million, which was included within "Impairment and other charges" on the consolidated statement of operations during the year ended December 31, 2021. In November 2022, Trinseo reached a final settlement with the European Commission in respect of this matter of $33.8 million, adjusted for foreign exchange rates, which was subsequently paid in full in December 2022. Refer to Note 16 in the consolidated financial statements for more information.

Acquisition of Heathland

On January 3, 2022, the Group closed on the previously-announced acquisition of Heathland for an estimated purchase price of $29.3 million, including an initial cash purchase price of $22.9 million, as well as $6.4 million of contingent cash consideration, representing the fair value of certain earn-out payments. Heathland is based in Utrecht, the Netherlands, and is focused on converting post-consumer and post-industrial PMMA, PC, ABS, polystyrene, and other thermoplastic waste for use in a wide range of high-end applications. The acquisition of Heathland is consistent with Trinseo's strategy and enhances our footprint as a sustainable solutions provider. Refer to Note 4 in the consolidated financial statements for more information.

Process Pause for Divestiture of Styrenics Business

In November 2021, the Group announced that it had begun work to explore the divestiture of our styrenics business and subsequently launched a formal sales process in the first quarter of 2022. The scope of the potential divestiture was expected to include the Feedstocks and Polystyrene reporting segments as well as our 50% ownership of Americas Styrenics. While this process generated broad and significant interest from both strategic and financial parties, the deterioration of financing markets and the economic uncertainty created by the war in Ukraine, particularly in European energy markets, has impeded the Group's ability to obtain full value for the styrenics business. As a result, the Group announced in July 2022 that it decided to pause the sale process.

This pause does not change the Group's transformation strategy of becoming a higher growth, higher margin, and less volatile specialty material and sustainable solutions provider. The Group intends to reevaluate a potential sale of the styrenics business when macroeconomic conditions improve.

Results of Operations

Results of Operations for the Years Ended December 31, 2022 and 2021

The table below sets forth our historical results of operations, and these results as a percentage of net sales for the periods indicated.

	Year Ended December 31,			
(in millions)	**2022**	**%**	**2021**	**%**
Net sales	$ 4,965.5	100 %	$ 4,827.5	100 %
Cost of sales	4,693.2	95 %	4,128.6	86 %
Gross profit	272.3	5 %	698.9	14 %
Selling, general and administrative expenses	398.8	8 %	323.4	7 %
Equity in earnings of unconsolidated affiliates	102.0	2 %	110.7	2 %
Impairment and other charges	303.4	6 %	43.0	1 %
Operating income (loss)	(327.9)	(7)%	443.2	8 %
Interest expense, net	112.9	2 %	79.4	2 %
Acquisition purchase price hedge loss (gain)	—	— %	22.0	— %
Other expense (income), net	(7.2)	— %	9.5	— %
Income (loss) from continuing operations before income taxes	(433.6)	(9)%	332.3	6 %
Provision for (benefit from) income taxes	(41.6)	(1)%	70.9	1 %
Net income (loss) from continuing operations	$ (392.0)	(8)%	$ 261.4	5 %
Net income (loss) from discontinued operations, net of income taxes	(2.9)	— %	160.4	3 %
Net income (loss)	$ (394.9)	(8)%	$ 421.8	8 %

2022 vs. 2021

Net Sales

Of the 3% increase in net sales, 11% was due to higher selling prices resulting mainly from the pass through of higher raw material costs. An additional 8% increase was due to the contribution from our acquisitions in 2021, including the PMMA Acquisition, which closed on May 3, 2021 and the Aristech Surfaces Acquisition, which closed on September 1, 2021. These increases were partially offset by a 13% decrease due to lower volumes across all segments caused by continued customer destocking exacerbated by extended year-end shutdowns at many customer sites, COVID-19 impacts in China, and underlying demand weakness stemming from an uncertain economic and geopolitical macroenvironment.

Cost of Sales

The 14% increase in cost of sales reflects a 13% increase in raw material costs, an 8% increase related to our acquisitions, and a 3% increase from higher utility costs. Partially offsetting these increases was a decrease of 10% due to lower volumes.

Gross Profit

The decrease in gross profit of 61% was primarily attributable to lower margins compared to the very high levels observed in 2021 in Feedstocks, Base Plastics, and Polystyrene, as well as lower sales volume, and higher raw material and utility costs as described above. These impacts were partially offset by additional gross profit from the 2021 acquisitions. See the segment discussion below for further information.

Selling, General and Administrative Expenses

The $75.4 million, or 23%, increase in SG&A was primarily due to an increase of $47.9 million in costs associated with the Group's strategic initiatives, and a $47.0 million increase in restructuring costs, driven by the asset restructuring plan approved in the fourth quarter of 2022. Also contributing was a $6.0 million increase in employee compensation, partially driven by a full year of additional personnel from the 2021 acquisitions, and a $5.3 million increase in bad debt expense. Offsetting these costs was a decrease of $46.9 million related to acquisition transaction and integration costs incurred, primarily in connection with the PMMA Acquisition in 2021.

Equity in Earnings of Unconsolidated Affiliates

The decrease in equity earnings of $8.7 million was due to lower sales volume that resulted from styrene production outages, a weaker demand environment including limited export opportunities and certain adjustments made to comply with Irish Company Law which were partially offset by higher equity earnings from Americas Styrenics, due mainly to higher styrene profitability.

Impairment and other charges

During the year ended December 31, 2022, the Group recorded a non-cash, goodwill impairment charge of $297.1 million related to the PMMA business and Aristech Surfaces reporting units, as described within Note 10 in the consolidated financial statements. During the year ended December 31, 2021, the Group recorded a charge of $36.2 million related to the European Commission request for information, as described within Note 16 in the consolidated financial statements. The Group also recorded impairment charges of $6.3 million and $6.8 million related to the Boehlen styrene monomer assets during the years ended December 31, 2022 and 2021, respectively, as described within Note 14 in the consolidated financial statements.

Interest Expense, Net

The increase in interest expense, net of $33.5 million, or 42%, was primarily attributable to the impact of the increase in the London Interbank Offered Rate year-over-year on our variable rate debt. Also contributing to the increase was the Group's issuance of the 2029 Senior Notes, which were not issued until late in the first quarter of 2021 and the 2028 Term Loan B, issued in the second quarter of 2021. Refer to Note 12 in the consolidated financial statements for further information.

Acquisition purchase price hedge loss (gain)

During the year ended December 31, 2021, the Group recorded an acquisition purchase price hedge loss of $22.0 million due to the change in fair value of the Group's forward currency hedge arrangement on the euro-denominated purchase price of the PMMA business.

Other Expense (Income), Net

Other income, net for the year ended December 31, 2022 was $7.2 million. Other income, net was comprised of foreign exchange transaction gains of $8.0 million, which included $41.0 million of foreign exchange transaction losses primarily from the remeasurement of our euro denominated payables due to the relative changes in rates between the U.S. dollar and the euro during the period, more than offset by $49.0 million of gains from our foreign exchange forward contracts.

Other expense, net for the year ended December 31, 2021 was $9.5 million, which included $5.2 million of expense related to the non-service cost components of net periodic benefit cost and $4.5 million of transfer taxes associated with the PMMA Acquisition. These expense amounts were partially offset by foreign exchange transaction gains of $1.3 million, which included $61.9 million of foreign exchange transaction losses primarily from the remeasurement of our euro denominated payables due to the relative changes in rates between the U.S. dollar and the euro during the period, more than offset by $63.2 million of gains from our foreign exchange forward contracts, excluding the acquisition purchase price hedge. Also included in Other expense, net was $0.5 million of loss on extinguishment of debt related to the Group's new financing arrangements entered into during the year.

Provision for (Benefit from) Income Taxes

Provision for (benefit from) income taxes was ($41.6) million and $70.9 million for the years ended December 31, 2022 and 2021, respectively, which resulted in an effective tax rate of 10% and 21%, respectively. The decrease in provision for income taxes was primarily driven by the $765.9 million decrease in income from continuing operations before income taxes, in addition to a release of a valuation allowance of $8.5 million in 2022, as a result of improvements in business operations and projected future results of the Group's Luxembourg subsidiary. Offsetting this decrease was the revaluation of the Group's net deferred tax assets in Switzerland which resulted in a one-time deferred tax expense of $15.3 million.

Net Income (Loss) from Discontinued Operations, Net of Income Taxes

Net income (loss) from discontinued operations, net of income taxes during the years ended December 31, 2022 and 2021 was ($2.9) million and $160.4 million, respectively, and was related to the results of our Rubber Business, including the divestiture of the business on December 1, 2021. This sale resulted in the recognition of an after-tax gain of $117.8 million, which is reflected in the results for the year ended December 31, 2021. Refer to Note 5 in the consolidated financial statements for further information.

Selected Segment Information

The Group's reportable segments are as follows: Engineered Materials, Latex Binders, Base Plastics, Polystyrene, Feedstocks, and Americas Styrenics. Refer to *Business Segments* for a description of our segments, including a detailed overview, products and end uses, and competition and customers.

The following sections present net sales, Adjusted EBITDA, and Adjusted EBITDA margin by segment for the years ended December 31, 2022 and 2021. Inter-segment sales have been eliminated. Refer to Note 20 in the consolidated financial statements for a detailed definition of Adjusted EBITDA and a reconciliation of income from continuing operations before income taxes to segment Adjusted EBITDA.

Engineered Materials Segment

($ in millions)	Year Ended December 31, 2022	2021	Percentage Change 2022 vs. 2021
Net sales	$ 1,044.4	$ 755.0	38 %
Adjusted EBITDA	$ 71.6	$ 94.8	(24)%
Adjusted EBITDA margin	7 %	13 %	

2022 vs. 2021

The 38% increase in net sales was primarily attributable to the contribution from the PMMA business and the Aristech Surfaces acquisitions, which led to a 47% increase year-over-year. In addition, sales price, primarily from the pass through of higher raw materials and energy costs, increased net sales by 9%. These increases were partially offset by a decrease of 17% from lower sales volumes, as demand declined from very high levels in the prior year due to weak underlying demand and customer destocking in the second half of the year, as well as COVID-19 lockdowns in China and geopolitical uncertainty in Europe in the year. In addition, particularly in the fourth quarter of 2022, volume was pressured as elevated natural gas prices in Europe and low demand in China created a temporary arbitrage window for lower-cost products from Asia to be more heavily imported into Europe. This predominantly impacted the non-formulated products in the portfolio including MMA and PMMA sheets.

Adjusted EBITDA decreased $23.2 million, or 24%, year-over-year. Lower margins contributed a $42.9 million, or 45%, decrease due to lower demand and higher supply including impacts from an increase of lower-cost products imported from Asia into Europe. Margins were also pressured by elevated natural gas prices in Europe, including a $10.0 million unfavorable impact from natural gas hedges, and one-time charges related to raw material contract obligations and write downs for slow-moving inventory. In addition, lower sales volumes as described above contributed to a $24.2 million, or 26% decrease, and higher fixed costs attributed to a $9.7 million, or 10%, decrease. These decreases were partially offset by the recent acquisitions of the PMMA business and Aristech Surfaces which contributed to a $52.3 million, or 55%, increase from the prior year.

Latex Binders Segment

($ in millions)	Year Ended December 31, 2022	2021	Percentage Change 2022 vs. 2021
Net sales	$ 1,256.5	$ 1,183.4	6 %
Adjusted EBITDA	$ 110.8	$ 106.5	4 %
Adjusted EBITDA margin	9 %	9 %	

2022 vs. 2021

The 6% increase in net sales was primarily due to a 16% increase in pricing from the pass through of raw material costs, which more than offset a 4% decrease due to foreign exchange rate impacts and a 6% decrease due to lower sales volumes across most applications from customer destocking and impacts from geopolitical uncertainty.

The $4.3 million, or 4%, increase in Adjusted EBITDA was primarily due to an increase of $31.2 million, or 29%, attributable to higher margins which was a result of favorable net timing and pricing actions. This increase was largely offset by a $17.0 million, or 16%, decrease from lower sales volumes and an $8.8 million, or 8%, decrease due to foreign exchange rate impacts. Higher fixed costs contributed to a $3.4 million, or 3%, decrease year-over-year.

Base Plastics Segment

($ in millions)	Year Ended December 31, 2022	2021	Percentage Change 2022 vs. 2021
Net sales	$1,323.0	$1,497.9	(12)%
Adjusted EBITDA	$ 91.0	$ 314.2	(71)%
Adjusted EBITDA margin	7 %	21 %	

2022 vs. 2021

Of the 12% decrease in net sales, 18% was due to lower sales volume, mainly in building & construction, industrial and consumer durables applications, including impacts from customer destocking and a weaker macroeconomic environment. Also contributing to the overall decrease was unfavorable foreign exchange rate impacts of 4%. These decreases were slightly offset by a 10% increase from higher pricing due to the pass through of raw material cost.

The $223.2 million, or 71%, decrease in Adjusted EBITDA was primarily due to lower margins of $104.3 million, or 33%, as weak demand pressured margins in polycarbonate and ABS products and led to lower sales volume of $92.2 million, or 29%. Also contributing to the decrease was unfavorable foreign exchange rate impacts of $10.2 million, or 3%, and a decrease of $17.7 million, or 6%, due to higher fixed costs resulting from lower fixed cost absorption.

Polystyrene Segment

($ in millions)	Year Ended December 31, 2022	2021	Percentage Change 2022 vs. 2021
Net sales	$ 1,093.1	$ 1,118.8	(2)%
Adjusted EBITDA	$ 99.3	$ 183.1	(46)%
Adjusted EBITDA margin	9 %	16 %	

2022 vs. 2021

Net sales decreased by 2% year-over-year. Lower sales volumes, including customer destocking amid falling raw material prices, led to an 8% decrease in net sales from prior year. The decrease was offset by a 5% increase from higher pricing, primarily from the pass through of higher styrene costs year-over-year.

The $83.8 million, or 46%, decrease in Adjusted EBITDA was due to a decrease of $70.3 million, or 38%, from lower margins and a decrease of $20.4 million, or 11%, was due to lower volumes. Weaker demand in appliance and building & construction applications, as well as new supply in China, contracted margins and led to lower volumes. Slightly offsetting these decreases was an increase of $7.3 million, or 4%, due to foreign exchange rate impacts.

Feedstocks Segment

($ in millions)	Year Ended December 31, 2022	2021	Percentage Change 2022 vs. 2021
Net sales	$ 248.5	$ 272.4	(9)%
Adjusted EBITDA	$ (75.2)	$ 33.7	(323)%
Adjusted EBITDA margin	(30)%	12 %	

2022 vs. 2021

Net sales decreased 9% year-over-year. Lower styrene-related sales volume resulted in a 28% decrease which was partially offset by a 19% increase due to higher styrene prices.

The decrease of $108.9 million, or 323%, in Adjusted EBITDA was primarily attributed to a $133.3 million, or 395%, decrease due to lower styrene margins including impacts from higher utility costs caused by a rise in natural gas prices in Europe and weaker demand. Slightly offsetting this decrease was an increase of $23.8 million, or 71%, due to foreign exchange rate impacts.

Americas Styrenics Segment

($ in millions)	Year Ended December 31, 2022	2021	Percentage Change 2022 vs. 2021
Adjusted EBITDA*	$ 102.0	$ 110.7	(8) %

**The results of this segment are comprised entirely of earnings from Americas Styrenics, our equity method investment. As such, Adjusted EBITDA related to this segment is included within "Equity in earnings of unconsolidated affiliates" in the consolidated statements of operations.*

2022 vs. 2021

The decrease in Adjusted EBITDA was due to lower volumes and certain adjustments made to comply with Irish Company Law which were partially offset by higher margins, including a stronger styrene spot market.

Outlook

The operating environment in the second half of 2022 was very challenging, which included significantly elevated natural gas cost in Europe, rapid customer destocking, and higher than normal imports of lower cost, standard-grade products entering Europe from Asia. However, while some of these conditions have persisted into the beginning of 2023, we have seen a meaningful decrease in European natural gas prices and, with the removal of COVID-related restrictions in China, more limited arbitrage opportunities for lower-cost standard grade products to enter Europe from Asia. Despite continued demand weakness, our first quarter 2023 profitability improved and we expect continued improvement as the year progresses from higher margins, as a result of moderating input costs and pricing initiatives, as well as cost savings from our previously announced asset restructuring initiatives. We expect additional improvement in the second quarter and the rest of the year from lower input and other costs, with a gradual demand increase through the end of the year. Market recovery and natural gas hedges remained a significant headwind in the first quarter 2023 and is expected to impact the remainder of the year, although natural gas hedge losses are expected to decrease as current forward rates stabilize.

Through this market volatility and uncertainty, the Group has access to capital resources and continues to focus on liquidity improvement actions to manage the anticipated impact of the challenging macroeconomic environment on our business operations for the foreseeable future. The profitability improvement factors noted above, coupled with certain cash preservation initiatives that we have undertaken, such as a reduction in working capital, capital expenditure deferments, and a planned further substantial reduction to our cash dividend will strengthen our liquidity and balance sheet, and are expected to position us to deliver sustained financial strength.

On March 24, 2023, due to equipment failure at the Bristol, Pennsylvania facility, operated by our wholly-owned subsidiary, Altuglas LLC, an accidental release of a latex emulsion product occurred, which ultimately flowed into a local waterway. We reported the event and cooperated closely with local, state, and federal authorities on the response activities. Water sampling conducted by the authorities did not detect site-related material in the waterway. The safety of our employees, our communities and our environment are a top priority, and we are committed to operate safely and without disturbance to our community. Refer to Note 16 in our consolidated financial statements for additional information related to this matter.

Non-GAAP Performance Measures

We present Adjusted EBITDA as a non-GAAP financial performance measure, which we define as income from continuing operations before interest expense, net; provision for income taxes; depreciation and amortization expense; loss on extinguishment of long-term debt; asset impairment charges; gains or losses on the dispositions of businesses and assets; restructuring charges; acquisition related costs and other items. In doing so, we are providing management, investors, and credit rating agencies with an indicator of our ongoing performance and business trends, removing the impact of transactions and events that we would not consider a part of our core operations.

There are limitations to using the financial performance measures such as Adjusted EBITDA. This performance measure is not intended to represent net income or other measures of financial performance. As such, it should not be used as an alternative to net income as an indicator of operating performance. Other companies in our industry may define Adjusted EBITDA differently than we do. As a result, it may be difficult to use this or similarly-named financial measures that other companies may use, to compare the performance of those companies to our performance. We compensate for these limitations by providing a reconciliation of this performance measure to our net income, which is determined in accordance with accounting principles generally accepted in the United States of America (“GAAP”).

Adjusted EBITDA is calculated as follows for the years ended December 31, 2022 and 2021.

	Year Ended December 31,	
(in millions)	**2022**	**2021**
Net income (loss)	**$ (394.9)**	**$ 421.8**
Net income (loss) from discontinued operations	(2.9)	160.4
Net income (loss) from continuing operations	(392.0)	261.4
Interest expense, net	112.9	79.4
Provision for (benefit from) income taxes	(41.6)	70.9
Depreciation and amortization	236.9	167.5
EBITDA[(a)]	$ (83.8)	$ 579.2
Net gain on disposition of businesses and assets	(1.8)	(0.6)
Restructuring and other charges[(b)]	15.9	9.0
Acquisition transaction and integration net costs [(c)]	6.6	75.3
Acquisition purchase price hedge (gain) loss [(d)]	—	22.0
Asset impairment charges or write-offs[(e)]	6.3	6.8
European Commission request for information[(f)]	—	36.2
Goodwill impairment charges[(g)]	297.1	—
Other items[(h)]	71.2	19.5
Adjusted EBITDA	$ 311.5	$ 747.4

(a) EBITDA is a non-GAAP financial performance measure that we refer to in making operating decisions because we believe it provides our management as well as our investors and credit agencies with meaningful information regarding the Group’s operational performance. We believe the use of EBITDA as a metric assists our board of directors, management and investors in comparing our operating performance on a consistent basis. Other companies in our industry may define EBITDA differently than we do. As a result, it may be difficult to use EBITDA, or similarly-named financial measures that other companies may use, to compare the performance of those companies to our performance. We compensate for these limitations by providing reconciliations of our EBITDA results to our net income, which is determined in accordance with GAAP.

(b) Restructuring and other charges for the years ended December 31, 2022 and 2021 primarily relate to charges incurred in connection with the Group's various restructuring programs. Refer to Note 21 in the consolidated financial statements for further information regarding restructuring activities.

Note that the accelerated depreciation charges incurred as part of both the Group's asset restructuring plan and corporate restructuring program are included within the "Depreciation and amortization" caption above, and therefore are not included as a separate adjustment within this caption.

(c) Acquisition transaction and integration net costs for the years ended December 31, 2022 and 2021 relate to expenses incurred for the PMMA Acquisition and the Aristech Surfaces Acquisition.

(d) The acquisition purchase price hedge loss for the year ended December 31, 2021 relates to the change in fair value of the Group's forward currency hedge arrangement that economically hedged the euro-denominated purchase price of the PMMA business. Refer to Note 13 in the consolidated financial statements for further information.

(e) Asset impairment charges or write-offs for the years ended December 31, 2022 and 2021 relate to the impairment of the Group's styrene monomer assets in Boehlen, Germany. Refer to Note 14 in the consolidated financial statements for further information.

(f) Amount for the year ended December 31, 2021 relates to the liability recorded in connection with the European Commission request for information, as described in Note 16 in the consolidated financial statements.

(g) Amount for the year ended December 31, 2022 relates to the goodwill impairment of the PMMA business and Aristech Surfaces reporting units. Refer to Note 10 in the consolidated financial statements for further information.

(h) Other items for the years ended December 31, 2022 and 2021 primarily relate to fees incurred in conjunction with certain of the Group's strategic initiatives, including our ERP upgrade project.

Liquidity and Capital Resources

Cash Flows

The table below summarizes our primary sources and uses of cash for the years ended December 31, 2022 and 2021. We have derived the summarized cash flow information from our audited financial statements.

	Year Ended December 31,	
(in millions)	**2022**	**2021**
Net cash provided by (used in):		
Operating activities - continuing operations	$ 46.4	$ 456.0
Operating activities - discontinued operations	(2.9)	(3.3)
Operating activities	43.5	452.7
Investing activities - continuing operations	(163.2)	(1,936.2)
Investing activities - discontinued operations	(0.8)	396.5
Investing activities	(164.0)	(1,539.7)
Financing activities	(233.7)	1,075.7
Effect of exchange rates on cash	(7.1)	(4.4)
Net change in cash, cash equivalents, and restricted cash	$ (361.3)	$ (15.7)

Operating Activities

Net cash provided by operating activities from continuing operations during the year ended December 31, 2022 totaled $46.4 million, inclusive of dividends received from Americas Styrenics of $95.0 million. Although operating results were challenged by macroeconomic conditions resulting in reduced customer demand, higher raw material and utility costs and negative earnings, there was a slight working capital build during the year. The rapid and significant increase in raw material prices, along with the historically high energy prices led to a significant working capital build in the first half of 2022. This build was largely offset with the working capital release in the second half of the year, primarily attributable to a steep decline in many raw material prices from the historically high prices seen in the second quarter, inventory control actions, and sequentially lower sales. Operating activities also included a one-time payment of $33.8 million related to the settlement of the European Commission request for information as described in Note 16 in the consolidated financial statements. Further, there was an increase in interest payments driven by the 2029 Senior Notes and the 2028 Term Loan B, both of which were outstanding for the full year, as well as the impact of the rising interest rates on our variable rate debt. Tax payments also increased, driven by higher earnings before income taxes in the prior year. Net cash used in operating activities from discontinued operations during the year ended December 31, 2022 totaled $2.9 million.

Net cash provided by operating activities from continuing operations during the year ended December 31, 2021 totaled $456.0 million, driven by strong earnings, and inclusive of dividends received from Americas Styrenics of $85.0 million. Partially offsetting these factors was a $23.0 million reduction in operating cash from a net working capital use during the period, primarily attributable to increases in raw material costs. Net cash used in operating activities from discontinued operations during the year ended December 31, 2021 totaled $3.3 million, and was related to the operations of our Rubber Business, which was sold during the period.

Investing Activities

Net cash used in investing activities from continuing operations during the year ended December 31, 2022 totaled $163.2 million, which was primarily attributable to net cash paid for asset or business acquisitions of $22.2 million (see Note 4 in the consolidated financial statements), and capital expenditures of $148.2 million, including cash spent for our ongoing enterprise resource planning system upgrade. Net cash used in investing activities from discontinued operations during the year ended December 31, 2022 totaled $0.8 million.

Capital expenditures for 2023 are expected to be approximately $100.0 million, inclusive of spending for both compliance and maintenance costs, and growth initiatives, including material substitution applications as well as products containing recycled or bio-based materials.

Net cash used in investing activities from continuing operations during the year ended December 31, 2021 totaled $1,936.2 million, which was primarily attributable to net cash paid for asset or business acquisitions of $1,804.0 million (see Note 4), capital expenditures of $117.7 million, and payments for the settlement of hedging instruments of $14.7 million (related to the acquisition purchase price hedge – see Note 13). Net cash provided by investing activities from discontinued operations during the year ended December 31, 2021 totaled $396.5 million, which was primarily attributable to cash received from the sale of the Rubber Business.

Financing Activities

Net cash used in financing activities during the year ended December 31, 2022 totaled $233.7 million. This activity was primarily due to $151.9 million of payments related to the repurchase of ordinary shares, $47.5 million of dividend payments, and $17.5 million of net repayments of short-term borrowings. In addition, there was $16.6 million of repurchases and repayments long-term debt during the period, primarily related to our 2024 Term Loan B and 2028 Term Loan B obligations.

Net cash provided by financing activities during the year ended December 31, 2021 totaled $1,075.7 million. This activity was primarily due to $746.3 million in proceeds from the issuance of the 2028 Term Loan B, $450.0 million in proceeds from the issuance of the 2029 Senior Notes, and $11.0 million in proceeds from exercise of option awards. This activity was partially offset by $48.1 million of ordinary share repurchases, $35.4 million of deferred financing fees paid, $14.6 million of net repayments of short-term borrowings, $21.9 million of dividend payments, and $10.7 million of net principal payments related to our 2024 Term Loan B and 2028 Term Loan B during the period.

Free Cash Flow

We use Free Cash Flow as a non-GAAP measure to evaluate and discuss the Group’s liquidity position and results. Free Cash Flow is defined as cash from operating activities, less capital expenditures. We believe that Free Cash Flow provides an indicator of the Group’s ongoing ability to generate cash through core operations, as it excludes the cash impacts of various financing transactions as well as cash flows from business combinations that are not considered organic in nature. We also believe that Free Cash Flow provides management and investors with useful analytical indicator of our ability to service our indebtedness, pay dividends (when declared), and meet our ongoing cash obligations.

Free Cash Flow is not intended to represent cash flows from operations as defined by GAAP, and therefore, should not be used as an alternative for that measure. Other companies in our industry may define Free Cash Flow differently than we do. As a result, it may be difficult to use this or similarly-named financial measures that other companies may use, to compare the liquidity and cash generation of those companies to our own. We compensate for these limitations by providing a reconciliation to cash provided by operating activities, which is determined in accordance with GAAP.

	Year Ended December 31,	
(in millions)	**2022**	**2021**
Cash provided by operating activities	$ 43.5	$ 452.7
Capital expenditures	(149.0)	(123.5)
Free Cash Flow	**$ (105.5)**	**$ 329.2**

Refer to the discussion above for significant impacts to cash provided by operating activities for the years ended December 31, 2022 and 2021.

Capital Resources, Indebtedness and Liquidity

We require cash principally for day-to-day operations, to finance capital investments and other initiatives, to purchase materials, to service our outstanding indebtedness, and to fund the return of capital to shareholders via dividend payments and ordinary share repurchases, when deemed appropriate. Our sources of liquidity include cash on hand, cash flow from continuing operations, and amounts available under the Senior Credit Facility and the Accounts Receivable Securitization Facility (discussed further below).

As of December 31, 2022 and 2021, we had $2,353.7 million and $2,368.8 million, respectively, in outstanding indebtedness and $701.3 million and $1,064.1 million, respectively, in working capital (calculated as current assets from continuing operations less current liabilities from continuing operations). In addition, as of December 31, 2022 and 2021, we had $168.7 million and $560.6 million, respectively, of foreign cash and cash equivalents on our consolidated balance sheets, outside of our country of domicile, which was Ireland as of December 31, 2022 and 2021, all of which is readily convertible into other foreign currencies, including the U.S. dollar. Our intention is not to permanently reinvest our foreign cash and cash equivalents. Accordingly, we record deferred income tax liabilities related to the unremitted earnings of our subsidiaries. For a detailed description of the Group's debt structure, borrowing rates, and expected future payment obligations, refer to Note 12 in the consolidated financial statements.

The following table outlines our outstanding indebtedness as of December 31, 2022 and 2021 and the associated interest expense, including amortization of deferred financing fees and issuance discounts. Effective interest rates for the borrowings included in the table below exclude the impact of deferred financing fee amortization, certain other fees charged to interest expense (such as fees for unused commitment fees during the period), and the impacts of derivatives designated as hedging instruments.

	As of and for the Year Ended December 31, 2022			As of and for the Year Ended December 31, 2021		
($ in millions)	Balance	Effective Interest Rate	Interest Expense	Balance	Effective Interest Rate	Interest Expense
Senior Credit Facility						
2024 Term Loan B	$ 663.4	3.9 %	$ 29.1	$ 670.4	2.1 %	$ 20.6
2028 Term Loan B	735.9	4.2 %	34.7	742.8	2.6 %	15.2
2026 Revolving Facility	—	— %	1.8	—	— %	2.1
2029 Senior Notes	447.0	5.1 %	24.8	450.0	5.1 %	19.0
2025 Senior Notes	500.0	5.4 %	25.8	500.0	5.4 %	20.7
Accounts Receivable Securitization Facility	—	— %	1.4	—	2.0 %	1.8
Other indebtedness*	7.4	5.1 %	0.1	5.6	2.2 %	—
Total	$ 2,353.7		$ 117.7	$ 2,368.8		$ 79.4

**For the year ended December 31, 2021, interest expense on "Other indebtedness" totaled less than $0.1 million.*

Our Senior Credit Facility includes the 2026 Revolving Facility, which matures in May 2026 and has a borrowing capacity of $375.0 million. The 2026 Revolving Facility contains a springing covenant which applies when 30% or more is drawn from the facility and would require the Group to meet a first lien net leverage ratio not to exceed 3.50x at the end of each financial quarter. As of December 31, 2022 the first lien net leverage ratio (as defined in our secured credit agreement) was 3.20x. As of December 31, 2022, the Group had $354.7 million of funds available for borrowing (net of $20.3 million outstanding letters of credit) under the 2026 Revolving Facility. Further, as of December 31, 2022, the Group is required to pay a quarterly commitment fee in respect of any unused commitments under the 2026 Revolving Facility equal to 0.375% per annum.

Also included in our Senior Credit Facility is our 2024 Term Loan B (with original principal of $700.0 million, maturing in September 2024), and our 2028 Term Loan B (with original principal of $750.0 million, maturing in May 2028), each of which requires scheduled quarterly payments in amounts equal to 0.25% of the original principal. The stated interest rate on our 2024 Term Loan B is London Interbank Offered Rate ("LIBOR") plus 2.00% (subject to a 0.00% LIBOR floor). The stated interest rate on our 2028 Term Loan B is LIBOR plus 2.50% (subject to a 0.00% LIBOR floor). The Group made net principal payments of $7.0 million on the 2024 Term Loan B and net principal payments of $7.5 million on the 2028 Term Loan B during the year ended December 31, 2022, with an additional $14.5 million of scheduled future payments classified within current debt on the Group's consolidated balance sheet as of December 31, 2022 related to both the 2024 Term Loan B and 2028 Term Loan B.

Our 2025 Senior Notes issued under the indenture executed in 2017 include $500.0 million aggregate principal amount of 5.375% senior notes that mature on September 1, 2025. Interest on the 2025 Senior Notes is payable semi-annually on May 3 and November 3 of each year. These Notes may be redeemed prior to their maturity at the option of the Group under certain circumstances at specific redemption prices. Refer to Note 12 in the consolidated financial statements for further information.

Our 2029 Senior Notes (with original principal of $500.0 million), as issued under the indenture executed in 2021, include $447.0 million aggregate principal amount of 5.125% senior notes that mature on April 1, 2029. Interest on the 2029 Senior Notes is payable semi-annually on February 15 and August 15 of each year, which commenced on August 15, 2021. These Notes may be redeemed prior to their maturity at the option of the Group under certain circumstances at specific redemption prices. Refer to Note 12 in the consolidated financial statements for further information.

We also continue to maintain our Accounts Receivable Securitization Facility, which matures in November 2024 and has an outstanding borrowing capacity of $150.0 million. As of December 31, 2022, there were no amounts outstanding under this facility and the Group had approximately $150.0 million of accounts receivable available to support this facility, based on the pool of eligible accounts receivable. Refer to Note 12 in the consolidated financial statements for further information on the facility.

Our ability to raise additional financing and our borrowing costs may be impacted by short- and long-term debt ratings assigned by independent rating agencies, which are based, in significant part, on our performance as measured by certain credit metrics such as interest coverage and leverage ratios.

We and our subsidiaries, affiliates, or significant shareholders may from time to time seek to retire or purchase our outstanding debt through cash purchases in the open market, privately negotiated transactions, exchange transactions or otherwise. Such repurchases or exchanges, if any, will depend on prevailing market conditions, our liquidity requirements, contractual restrictions and other factors. The amounts involved may be material.

Trinseo Materials Operating S.C.A. and Trinseo Materials Finance, Inc. (the "Issuers" of our 2029 Senior Notes and 2025 Senior Notes and "Borrowers" under our Senior Credit Facility) are dependent upon the cash generation and receipt of distributions and dividends or other payments from our subsidiaries and joint venture in order to satisfy their debt obligations. There are no known significant restrictions by third parties on the ability of subsidiaries of the Group to disburse or dividend funds to the Issuers and the Borrowers in order to satisfy these obligations. However, as the Group's subsidiaries are located in a variety of jurisdictions, the Group can give no assurances that our subsidiaries will not face transfer restrictions in the future due to regulatory or other reasons beyond our control.

The Senior Credit Facility and Indentures also limit the ability of the Borrowers and Issuers, respectively, to pay dividends or make other distributions to Trinseo PLC, which could then be used to make distributions to shareholders. During the year ended December 31, 2022, the Group declared total dividends of $1.28 per ordinary share, or $46.4 million, of which $12.5 million, inclusive of dividend equivalents, remains accrued as of December 31, 2022 and the majority of which was paid in January 2023. These dividends are well within the available capacity under the terms of the restrictive covenants contained in the Senior Credit Facility and Indentures. Further, significant additional capacity continues to be available under the terms of these covenants to support expected future dividends to shareholders, should the Group continue to declare them.

The Group's cash flow generation in recent years has been healthy. Despite the challenging and uncertain market conditions we experienced in 2022, the Group generated positive cash flows from operating activities for the year ended December 31, 2022. As the operating conditions in the beginning of 2023 were largely similar to 2022, the Group exceeded the first lien net leverage ratio as of March 31, 2023, which limits the availability of the 2026 Revolving Facility to 30% of the total capacity. However, we believe funds provided by operations, our existing cash and cash equivalent balances of $211.7 million as of December 31, 2022, coupled with borrowings available under our 2026 Revolving Facility and our Accounts Receivable Securitization Facility totaling a minimum of $252.2 million, which reflects the borrowing limit imposed by the aforementioned springing covenant, will be adequate to meet all necessary operating and capital expenditures for at least the next 12 months under current operating conditions, while continuing to invest in our growth and sustainability objectives.

Further, we also believe that our financial resources will allow us to manage the anticipated impact of this challenging macroeconomic environment on our business operations for the foreseeable future, which could include lower demand, reductions in revenue or delays in payments from customers and other third parties. Our ability to generate cash from operations to pay our indebtedness and meet other liquidity needs is subject to certain risks described herein and under *Principal Risks and Uncertainties*. As of December 31, 2022, we were in compliance with all the covenants and default provisions under our debt agreements. Refer to Note 12 in the consolidated financial statements for further information on the details of the covenant requirements.

The ongoing war in Ukraine and the corresponding sanctions and other measures being imposed by various governments have impacted global markets, particularly in Europe, leading to: (i) high volatility and increasing prices for natural gas and other energy supplies, (ii) changing trade flow patterns, and (iii) increasing levels of economic and geopolitical uncertainty globally. We do not have manufacturing operations in Ukraine, Russia or Belarus, and we have temporarily suspended sales and deliveries to Russia and Belarus, which sales do not constitute a material portion of our business. However, a significant escalation or expansion of economic disruption caused by this conflict, including supply disruptions, higher costs of raw materials or energy could have a material adverse effect on our results of operations, financial condition and cash flows. We are actively monitoring the broader economic impact from the crisis, in particular on the price and availability of raw materials and energy.

We do not have any off-balance sheet financing arrangements that we believe are reasonably likely to have a material current or future effect on our financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources.

Contractual Obligations and Commercial Commitments

The Group's primary contractual obligations and commercial commitments consist of the payments for principal and interest on our outstanding long-term debt, raw material purchases, funding requirements under our pension and other postretirement benefits, lease commitments, and obligations under our SAR SSAs.

The Group has both fixed and variable-rate long-term debt arrangements, which have varying principal and interest payment requirements over their contractual terms. Refer to the table and section above as well as to Note 12 in the consolidated financial statements for more information on our debt arrangements. Additionally, refer to *Market Risk* for discussion of our interest rate and foreign currency risks related to our debt and debt-related hedging arrangements.

The Group has certain raw material purchase contracts where we are required to purchase certain minimum volumes at the then prevailing market prices. During the year ended December 31, 2022, the Group recorded a one-time charge within "Cost of sales" in the consolidated statement of operations of approximately $18.1 million related to estimated raw material purchase contract obligations. As of December 31, 2022, the Group had $1,349.5 million of raw material purchase obligations, of which $478.6 million is due within the next twelve months. These commitments have remaining terms ranging from one to four years. Refer to Note 16 in the consolidated financial statements for more information on raw material purchase commitments. Additionally, refer to *Sources and Availability of Raw Materials* for further description of the sources of our key raw materials.

The Group has various pension and other postretirement plans. The Group is required to make minimum contributions to certain of our funded pension plans and is also obligated to make benefit payments to employees for the unfunded pension plans and other postretirement plans. As of December 31, 2022, the Group's estimated future benefit payments through 2032, reflecting expected future service, as appropriate, was $132.9 million, of which $10.0 million is due within the next twelve months. Refer to the section of our Critical Accounting Policies and Estimates entitled "Pension Plans and Postretirement Benefits" for more information on the factors impacting our pension and postretirement costs. Additionally, refer to Note 17 in the consolidated financial statements for more details on these employee benefit plans and the future payments expected to be made for them through 2032.

The Group has operating and finance leases for certain of its plant and warehouse sites, office spaces, rail cars, storage facilities, and equipment. The Group's leases have remaining terms of four months through thirteen years. As of December 31, 2022, the Group's estimated minimum commitments related to our finance and operating lease obligations was $96.3 million, of which $19.9 million is due within the next twelve months. Refer to Note 24 in the consolidated financial statements for further information on our lease portfolio and future lease obligations.

As described in *Our Relationship with Dow*, the Group is party to SAR SSAs with Dow, which are agreements under which Dow provides certain site services to the Group at Dow-owned locations. Based on our current year known costs and assuming that we continue with the SAR SSAs with similar annualized costs going forward, we estimate our contractual obligations under these agreements to be approximately $192.3 million annually for 2023 through 2027, and a total of $2,158.9 million thereafter through June 2039. Refer to the aforementioned section for more information regarding these agreements, including details regarding the rights of the Group and Dow to terminate said agreements.

Derivative Instruments

The Group's ongoing business operations expose it to various risks, including fluctuating foreign exchange rates, interest rate risk, and commodity price risk. To manage this risk, the Group periodically enters into derivative financial instruments, such as foreign exchange forward contracts, interest rate swap agreements, and commodity swap agreements. A summary of these derivative financial instrument programs is described below; however, refer to Note 13 of the consolidated financial statements for further information. The Group does not hold or enter into financial instruments for trading or speculative purposes.

Foreign Exchange Forward Contracts

Certain subsidiaries have assets and liabilities denominated in currencies other than their respective functional currencies, which creates foreign exchange risk. Our principal strategy in managing exposure to changes in foreign currency exchange rates is to naturally hedge the foreign currency-denominated liabilities on our consolidated balance sheets against corresponding assets of the same currency such that any changes in liabilities due to fluctuations in exchange rates are offset by changes in their corresponding foreign currency assets. In order to further reduce our exposure, the Group uses foreign exchange forward contracts to economically hedge the impact of the variability in exchange rates on our assets and liabilities denominated in certain foreign currencies. These derivative contracts are not designated for hedge accounting treatment.

Foreign Exchange Cash Flow Hedges

The Group also enters into forward contracts with the objective of managing the currency risk associated with forecasted U.S. dollar-denominated raw materials purchases by one of our subsidiaries whose functional currency is the euro. By entering into these forward contracts, which are designated as cash flow hedges, the Group buys a designated amount of U.S. dollars and sells euros at the prevailing market rate to mitigate the risk associated with the fluctuations in the euro-to-U.S. dollar foreign currency exchange rate.

Commodity Cash Flow Hedges & Commodity Economic Hedges

The Group purchases certain commodities, primarily natural gas, to operate facilities and generate heat and steam for various manufacturing processes, which are subject to price volatility. In order to manage the risk of price fluctuations associated with these commodity purchases, as deemed appropriate, the Group may enter into commodity swaps agreements or option contracts. Under these derivative contracts, the Group is effectively converting a portion of our natural gas costs into a fixed rate obligation to mitigate the risk of price fluctuations associated with the underlying commodity purchases. Certain of these commodity swaps are designated as cash flow hedges ("commodity cash flow hedges"), and the remaining commodity swaps are not designated for hedge accounting treatment ("commodity economic hedges").

Interest Rate Swaps

The Group enters into interest rate swap agreements to manage our exposure to variability in interest payments associated with the Group's variable rate debt. Under these interest rate swap agreements, which are designated as cash flow hedges, the Group is effectively converting a portion of our variable rate borrowings into a fixed rate obligation to mitigate the risk of variability in interest rates. The Group does not have any outstanding interest rate swap agreements as of December 31, 2022.

Net Investment Hedge

The Group had certain fixed-for-fixed cross currency swaps ("CCS"), swapping U.S. dollar principal and interest payments on our 2025 Senior Notes for euro-denominated payments, which were designated as a hedge of the Group's net investment in certain European subsidiaries under the spot method through the original CCS agreement entered into on September 1, 2017 ("2017 CCS"). As such, changes in the fair value of the 2017 CCS that were included in the assessment of effectiveness (changes due to spot foreign exchange rates) were recorded as cumulative foreign currency translation within accumulated other comprehensive income or loss ("AOCI"), and will remain in AOCI until either the sale or substantially complete liquidation of the subsidiary. Additionally, the initial value of any component excluded from the assessment of effectiveness is recognized in income using a systematic and rational method over the life of the hedging instrument. Any difference between the change in the fair value of the excluded component and amounts recognized in income under that systematic and rational method is recognized in AOCI. The Group elected to amortize the initial excluded component value as a reduction of "Interest expense, net" in the consolidated statements of operations using the straight-line method over the remaining term of the 2017 CCS. Additionally, the Group recognizes the accrual of periodic USD and euro-denominated interest receipts and payments under the terms of CCS arrangements, including the 2017 CCS, within "Interest expense, net" in the consolidated statements of operations.

On February 26, 2020, the Group settled our 2017 CCS and replaced it with a new CCS arrangement (the "2020 CCS") that carried substantially the same terms as the 2017 CCS and also is designated as a net investment hedge under the spot method. Upon settlement of the 2017 CCS, the Group realized net cash proceeds of $51.6 million. The remaining $13.8 million unamortized balance of the initial excluded component related to the 2017 CCS at the time of settlement is no longer being amortized following the settlement and will remain in AOCI until either the sale or substantially complete liquidation of the relevant subsidiaries. On April 7, 2022, the Group settled its existing 2020 CCS, which was set to mature in November 2022. Upon settlement of the 2020 CCS, the Group realized net cash proceeds of $1.9 million.

Critical Accounting Policies and Estimates

Our discussion and analysis of results of operations and financial condition are based upon our financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America ("GAAP"). The preparation of these financial statements requires us to make estimates and judgments that affect the amounts reported. We base these estimates and judgments on historical experiences and assumptions believed to be reasonable under the circumstances. Actual results could vary from our estimates under different conditions. Our significant accounting policies, which may be affected by our estimates and assumptions, are more fully described in Note 2 in the consolidated financial statements. An accounting policy is deemed to be critical if it requires an accounting estimate to be made based on assumptions about matters that are highly uncertain at the time the estimate is made, and if different estimates that reasonably could have been used, or changes in the accounting estimates that are reasonably likely to occur periodically, could materially impact the financial statements. The following critical accounting policies reflect our most significant estimates and assumptions used in the preparation of the consolidated financial statements.

Business Combinations and Asset Impairments

Business Combinations

Acquisitions that qualify as a business combination are accounted for using the purchase accounting method. Amounts paid for an acquisition are allocated to the assets acquired and liabilities assumed based on their fair value as of the date of acquisition. Goodwill is recorded as the difference between the fair value of the acquired assets and liabilities assumed (net assets acquired) and the purchase price. Goodwill is not amortized, but is reviewed for impairment annually as of October 1, or when events or changes in the business environment indicate that the carrying value of a reporting unit may exceed its fair value. Refer to the discussion below for further information on asset impairments.

Under the purchase accounting method, the Group completes valuation procedures for an acquisition, often with the assistance of third-party valuation specialists, to determine the fair value of the assets acquired and liabilities assumed. These valuation procedures require management to make assumptions and apply significant judgment to estimate the fair value of the assets acquired and liabilities assumed. If the estimates or assumptions used should significantly change, the resulting differences could materially affect the fair value of net assets.

Specifically, the calculation of the fair value of tangible assets, including property, plant and equipment, typically utilize the cost approach, which computes the cost to replace the asset, less accrued depreciation resulting from physical deterioration and functional and external obsolescence. The calculation of the fair value of identified intangible assets is determined using cash flow models following the income and cost approaches (or some combination thereof). Significant inputs include estimated future cash flows, discount rates, royalty rates, growth rates, sales projections, customer retention rates, and terminal values, all of which require significant management judgment. Definite-lived intangible assets, which are primarily comprised of customer relationships, developed technology, tradenames, and software, are amortized over their estimated useful lives using the straight-line method and are assessed for impairment whenever events or changes in circumstances indicate the carrying value of the asset may not be recoverable.

During the year ended December 31, 2022, the Group completed the Heathland Acquisition, which closed on January 3, 2022. Refer to Note 4 in the consolidated financial statements for further information on this transaction.

Asset Impairments

As of December 31, 2022, net property, plant and equipment, net identifiable finite-lived intangible assets, and goodwill totaled $691.1 million, $772.0 million, and $410.4 million, respectively. Management makes estimates and assumptions in preparing the consolidated financial statements for which actual results will emerge over long periods of time. This includes the recoverability of long-lived assets employed in the business. These estimates and assumptions are closely monitored by management and periodically adjusted as circumstances warrant. For instance, expected asset lives may be shortened or impairment may be recorded based on a change in the expected use of the asset or performance of the related asset group.

We evaluate long-lived assets and identifiable finite-lived intangible assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset or asset grouping may not be recoverable. In the event the carrying value of the asset exceeds its undiscounted future cash flows and the carrying value is not considered recoverable, impairment may exist. An impairment loss, if any, is measured as the excess of the asset's carrying value over its fair value, generally based on a discounted future cash flow method, independent appraisals, etc.

In connection with our strategy to focus efforts and increase investments in certain product offerings serving specific applications that are less cyclical and offer significantly higher growth and margin potential, and other management considerations, in March of 2020, the Group initiated a consultation process with the Economic Council and Works Councils of Trinseo Deutschland regarding the disposition of our styrene monomer assets in Boehlen, Germany. The Group's assessments of these long-lived asset groups for impairment indicated that the carrying values of the asset groups at each location were not recoverable when compared to the expected undiscounted future cash flows from the operation and potential disposition of these assets. The fair value of the depreciable assets at each location was determined through an analysis of the underlying fixed asset records in conjunction with the use of industry experience and available market data. Based on the Group's assessments, for the year ended December 31, 2022, we recorded impairment charges on the Boehlen styrene monomer assets of $6.3 million, which include charges recorded subsequent to March 2020 related to capital expenditures at the facility that we determined to be impaired. The amounts are included within "Impairment and other charges" in the consolidated statements of operations and are all allocated to the Feedstocks segment. Refer to Note 14 for more information.

Through December 31, 2022, we have continued to assess the recoverability of certain assets, and concluded there are no additional significant events or circumstances identified by management that would indicate these assets are not recoverable. However, the current environment is subject to changing market conditions and requires significant management judgment to identify the potential impact to our assessment. If we are not able to achieve certain actions or our future operating results do not meet our expectations, it is possible that impairment charges may need to be recorded on one or more of our operating facilities.

Long-lived assets to be disposed of by sale are classified as held-for-sale and are reported at the lower of carrying amount or fair value less cost to sell, and depreciation is ceased. Long-lived assets to be disposed of in a manner other than by sale are classified as held-and-used until they are disposed. The Group had no assets classified as held-for-sale as of December 31, 2022.

As noted above, our goodwill impairment testing is performed annually as of October 1 at a reporting unit level. We perform more frequent impairment tests when events or changes in circumstances indicate that the fair value of a reporting unit has more likely than not declined below the carrying value.

A goodwill impairment loss generally would be recognized when the carrying amount of the reporting unit's net assets exceeds the estimated fair value of the reporting unit. When supportable, the Group employs the qualitative assessment of goodwill impairment prescribed by Accounting Standards Codification 350. Otherwise, the estimated fair value of a reporting unit is primarily determined using an income approach (under the discounted cash flow method). Key assumptions and estimates used in the goodwill impairment testing include projections of revenues and EBITDA, the estimated weighted average cost of capital ("WACC"), and a projected long-term growth rate, all of which are based on data available at the time of the testing. The WACC is calculated incorporating weighted average returns on debt and equity from similar market participants, and therefore, changes in the market, which are beyond the control of the Group, may have an impact on future calculations of estimated fair value.

As a result of the goodwill impairment testing performed in the fourth quarter of 2022, the PMMA business and Aristech Surfaces carrying value of their net assets exceeded fair value, resulting in an impairment. All other reporting units had fair values that exceeded the carrying value of their net assets, indicating that no impairment of goodwill is warranted. These reporting units, which are included in the Engineered Materials operating segment, were acquired in 2021 as described in Note 4 in the consolidated financial statements. The impairment charges were attributed to the continuation of the challenging macroeconomic environment experienced in 2022, including significantly lower demand for building & construction and wellness applications, which led to lower operating results including slower growth projections, and a prolonged drop in market capitalization, as well as an increase in the WACC. The Group reduced the carrying value of the PMMA business and Aristech Surfaces reporting units through the recognition of a $226.6 million and $70.5 million non-cash goodwill impairment loss, respectively. These losses are recorded within "Impairment and other charges" on the consolidated statement of operations and are allocated to the Engineered Materials segment.

As of December 31, 2022, the remaining $410.4 million in total goodwill is allocated to the reportable segments as follows: $348.9 million to Engineered Materials, $14.8 million to Latex Binders, $42.5 million to Base Plastics, and $4.2 million to Polystyrene, with no amounts allocated to the Feedstocks or Americas Styrenics segments.

Factors which could result in future impairment charges, among others, include changes in worldwide economic conditions, changes in technology, changes in competitive conditions and customer preferences, and fluctuations in foreign currency exchange rates. These factors are discussed in *Market Risk* and *Principal Risks and Uncertainties* included in this Director's Report and Financial Statements (the "Annual Report").

Income Taxes

We account for income taxes using the asset and liability method. Under this method, deferred tax assets and liabilities are recognized for the future tax consequences of temporary differences between the carrying amounts and tax bases of assets and liabilities using enacted rates. The effect of a change in tax rates on deferred taxes is recognized in income in the period that includes the enactment date.

Deferred taxes are provided on the outside basis differences and unremitted earnings of subsidiaries outside of Ireland. All undistributed earnings of foreign subsidiaries and affiliates are expected to be repatriated as of December 31, 2022. Based on the evaluation of available evidence, both positive and negative, we recognize future tax benefits, such as net operating loss carryforwards and tax credit carryforwards, to the extent that realizing these benefits is considered to be more likely than not.

As of December 31, 2022, we had deferred tax assets of $163.6 million, after valuation allowances of $118.4 million. In evaluating the ability to realize the deferred tax assets, we rely on, in order of increasing subjectivity, taxable income in prior carryback years, the future reversals of existing taxable temporary differences, tax planning strategies and forecasted taxable income using historical and projected future operating results.

Swiss federal and cantonal tax reform was enacted on August 6, 2019 and October 25, 2019, respectively, and includes measures such as, the elimination of certain preferential tax regimes and implementation of new tax rates at both the federal and cantonal levels. It also includes transitional relief measures which may provide for future tax deductions. The Group believes it is more likely than not that a portion of this deferred tax benefit recorded as a result of these cantonal tax law changes will not be realized during the utilization period provided by the legislation, spanning 2023 through 2029. This is based on the Group's estimate of future taxable income in Switzerland, which was determined using management's judgment and assumptions about various factors, such as: historical experience and results, cyclicality of the business, implications of COVID-19, recent acquisitions and divestitures, and future industry and macroeconomic conditions and trends possible during the aforementioned utilization period. During the second quarter of 2022, Trinseo revalued its deferred tax assets in Switzerland, as well as adjusted the related valuation allowance. Trinseo reduced the deferred tax asset by $19.7 million and released a corresponding valuation allowance of $4.4 million. As of December 31, 2022, due to foreign exchange translation, the total valuation allowance recorded was $20.1 million.

As of December 31, 2022, we had deferred tax assets for tax loss carryforward of approximately $582.1 million, $21.6 million of which is subject to expiration in the years between 2023 and 2027 and $560.4 million of the operating loss carryforwards expire in years beyond 2027 or have an indefinite carryforward period. We continue to evaluate our historical and projected operating results for several legal entities for which we maintain valuation allowances on net deferred tax assets.

We are subject to income taxes in Ireland, the United States and numerous foreign jurisdictions, and are subject to audit within these jurisdictions. Therefore, in the ordinary course of business there is inherent uncertainty in quantifying our income tax positions. The tax provision includes amounts considered sufficient to pay assessments that may result from examinations of prior year tax returns; however, the amount ultimately paid upon resolution of issues raised may differ from the amounts accrued. Since significant judgment is required to assess the future tax consequences of events that have been recognized in our financial statements or tax returns, the ultimate resolution of these events could result in adjustments to our financial statements and such adjustments could be material. Therefore, we consider such estimates to be critical in preparation of our financial statements.

The financial statement effect of an uncertain income tax position is recognized when it is more likely than not, based on the technical merits, that the position will be sustained upon examination. Accruals are recorded for other tax contingencies when it is probable that a liability to a taxing authority has been incurred and the amount of the contingency can be reasonably estimated. Uncertain income tax positions have been recorded in "Other noncurrent obligations" in the consolidated balance sheets for the periods presented.

Management judgment is required in determining our provision for income taxes, our deferred tax assets and liabilities, and any valuation allowance recorded against our deferred tax assets. The valuation allowance is based on our estimates of future taxable income and the period over which we expect the deferred tax assets to be recovered. Our estimate of future taxable income is based on management's judgment and assumptions about various factors including historical experience and results, cyclicality of the business, and future industry and macroeconomic conditions and trends. Changes in these assumptions in future periods may require we adjust our valuation allowance, which could materially impact our financial position and results of operations.

Pension Plans and Postretirement Benefits

We have various company-sponsored retirement plans covering substantially all employees. We also provide certain health care and life insurance benefits to retired employees in the United States. The U.S.-based plans provide health care benefits, including hospital, physicians' services, drug and major medical expense coverage, and life insurance benefits. We recognize the underfunded or overfunded status of a defined benefit pension or postretirement plan as an asset or liability in our consolidated balance sheets and recognize changes in the funded status in the year in which the changes occur through AOCI, which is a component of shareholders' equity.

A settlement is a transaction that is an irrevocable action that relieves the employer (or the plan) of primary responsibility for a pension or postretirement benefit obligation, and that eliminates significant risks related to the obligation and the assets used to effect the settlement. The Group does not record settlement gains or losses during interim periods when the cost of all settlements in a year is less than or equal to the sum of the service cost and interest cost components of net periodic benefit cost for the plan in that year.

Pension benefits associated with these plans are generally based on each participant's years of service, compensation, and age at retirement or termination. The discount rate is an important element of expense and liability measurement. We evaluate our assumptions at least once each year, or as facts and circumstances dictate, and make changes as conditions warrant.

We determine the discount rate used to measure plan liabilities as of the December 31 measurement date for the pension and postretirement benefit plans. The discount rate reflects the current rate at which the associated liabilities could be effectively settled at the end of the year. We set our discount rates to reflect the yield of a portfolio of high quality, fixed-income debt instruments that would produce cash flows sufficient in timing and amount to settle projected future benefits.

We use a full yield curve approach in the estimation of the future service and interest cost components of net periodic benefit cost for our defined benefit pension and other postretirement benefit plans by applying the specific spot rates along the yield curve used in the determination of the benefit obligation to the relevant projected cash flows. Service cost related to our defined benefit pension plans and other postretirement plans is included within "Cost of sales" and "Selling, general and administrative expenses," whereas all other components of net periodic benefit cost are included within "Other expense (income), net" in the consolidated statements of operations.

We determine the expected long-term rate of return on assets by performing an analysis of historical and expected returns based on the underlying assets, which generally are insurance contracts. We also consider our historical experience with the pension fund asset performance. The expected return of each asset class is derived from a forecasted future return confirmed by current and historical experience. Future actual net periodic benefit cost will depend on the performance of the underlying assets and changes in future discount rates, among other factors.

The weighted average assumptions used to determine pension plan obligations and net periodic benefit costs are provided below:

	Non-U.S. Defined Benefit Pension Plans		U.S. Defined Benefit Pension Plans		Other Postretirement Benefit Plans	
	December 31,		December 31,		December 31,	
	2022	2021	2022	2021	2022	2021
Pension and other postretirement plan obligations:						
Discount rate for projected benefit obligation / accumulated postretirement benefit obligation	3.51 %	1.10 %	5.53 %	2.92 %	6.01 %	2.90 %
Net periodic benefit costs:						
Discount rate for service cost	1.20 %	0.78 %	3.00 %	3.20 %	2.99 %	3.32 %
Discount rate for interest cost	0.93 %	0.57 %	2.44 %	2.37 %	2.42 %	2.34 %
Expected long-term rate of return on plan assets	0.84 %	0.66 %	5.40 %	5.89 %	N/A	N/A

Holding all other factors constant, a 0.25% increase (decrease) in the discount rate used to determine net periodic benefit cost would decrease (increase) 2023 pension expense for our non-U.S. plans by approximately $1.1 million and $(1.3) million, respectively. Holding all other factors constant, a 0.25% increase (decrease) in the long-term rate of return on assets used to determine net periodic benefit cost for our non-U.S. plans would decrease (increase) 2023 pension expense by approximately $0.1 million and $(0.1) million, respectively. Holding all other factors constant, a 0.25% increase or decrease in the discount rate, or the long-term rate of return on assets, used to determine net periodic benefit cost for our U.S. plans would change our 2023 pension expense by less than $0.1 million.

Plan assets totaled $99.5 million and $157.1 million as of December 31, 2022 and 2021. As noted above, plan assets are invested primarily in insurance contracts that provide for guaranteed returns. Investments in the pension plan insurance contracts are valued utilizing unobservable inputs, which are contractually determined based on returns, fees, and the present value of the future cash flows, or cash surrender values, of the contracts, and are classified as Level 3 investments. The Group presents certain pension plan assets valued at net asset value per share as a practical expedient outside of the fair value hierarchy.

Recent Accounting Pronouncements

We describe the impact of recent accounting pronouncements in Note 2 of the consolidated financial statements, included elsewhere within this Annual Report.

Dividends

During the year ended December 31, 2022 and 2021, Trinseo declared $46.4 million and $31.4 million of dividends, respectively.

Acquisition and Cancellation of Own Shares

The Group held 1.0 million and 1.0 million of its own shares as of December 31, 2022 and 2021, respectively, which amounted to 2.50% and 2.50% of total shares issued as of December 31, 2022 and 2021, respectively. The Group acquires its own shares based on capital allocation strategies. The par value of each ordinary share is $0.01.

The Group's own shares activity for the years ended December 31, 2022 and 2021 was as follows:

	Year Ended December 31, 2022		Year Ended December 31, 2021	
	Shares	Amount	Shares	Amount
Balance at beginning of period	1.0	$ 50.0	10.4	$ 542.9
Payments to acquire own shares	3.1	150.0	1.0	50.0
Share-based compensation activity	—	—	(0.5)	(18.1)
Cancellation of own shares	—	—	(9.9)	(524.8)

Balance at end of period	4.1	$ 200.0	1.0	$ 50.0

Accounting Records

The Directors are responsible for ensuring that Trinseo PLC keeps accounting records and appropriate accounting systems. To achieve this, the Directors have appointed a Chief Financial Officer who makes regular reports to the Board of Directors and ensures compliance with the requirements of Section 281 to 285 of the Companies Act, 2014. The Chief Financial Officer makes regular reports to the Audit Committee of the Board of Directors. The Audit Committee, in turn, briefs the full Board of Directors on significant financial matters arising from reports of the Chief Financial Officer and the external auditor. The measures taken by the Directors to secure compliance with Trinseo PLC's obligation to keep accounting records are the use of appropriate systems and procedures and employment of competent persons. The accounting records are kept at 440 East Swedesford Road, Suite 301, Wayne, PA 19087.

Significant Events Since Year End

Subsequent events have been considered through the date this Annual Report was approved by the Board of Directors. No such events have occurred that would materially impact the Group’s financial statements since the balance sheet, other than those noted in Note 32, “Subsequent Events” to the consolidated financial statements.

Directors and Secretary

The following table lists directors who have served during the year ended December 31, 2022.

Reporting Person
Frank A. Bozich
Angelo N. Chaclas(1)
Joseph Alvarado
Victoria Brifo
Jeffrey J. Cote
Pierre-Marie De Leener
Jeanmarie Desmond
Matthew Farrell
K’Lynne Johnson
Sandra Beach Lin
Philip R. Martens
Donald T. Misheff
Henri Steinmetz
Mark Tomkins

(1) Mr. Chaclas serves as the Group’s secretary.

Directors' and Secretary's Interests

The interests in the ordinary shares of the Group of the Directors and Corporate Secretary of Trinseo PLC in office at December 31, 2022 and December 31, 2021, were as follows:

	December 31, 2022				December 31, 2021			
Reporting Person	**Options(1)**	**RSUs(2)**	**PSUs(3)**	**Total Ownership**	**Options(1)**	**RSUs(2)**	**PSUs(3)**	**Total Ownership**
Frank A. Bozich	194,854	71,990	95,985	419,058	225,936	87,396	109,985	450,317
Angelo N. Chaclas	78,561	15,353	20,470	136,065	68,944	15,556	20,748	120,702
Joseph Alvarado	-	3,183	-	16,695	-	2,260	-	13,611
Victoria Brifo	-	3,183	-	4,358	-	2,260	-	2,260
Jeffrey J. Cote	-	3,183	-	30,117	-	2,260	-	18,047
Pierre-Marie De Leener	-	3,183	-	12,103	-	2,260	-	10,005
Jeanmarie Desmond	-	3,183	-	8,515	-	2,260	-	2,260
Matthew Farrell	-	3,183	-	21,358	-	2,260	-	19,260
K'Lynne Johnson	-	3,183	-	13,135	-	2,260	-	11,065
Sandra Beach Lin	-	3,183	-	9,299	-	2,260	-	7,215
Philip R. Martens	-	3,183	-	10,300	-	2,260	-	15,130
Donald T. Misheff	-	3,183	-	20,553	-	2,260	-	18,455
Henri Steinmetz	-	3,183	-	29,382	-	2,260	-	27,284
Mark Tomkins	-	3,183	-	12,085	-	2,260	-	10,015

(1) Amounts include vested and unvested options.
(2) Amounts include unvested time-vesting RSUs.
(3) Amounts include unvested performance-vesting performance share units ("PSUs").

Political Donations

No political donations that require disclosure under Irish law were made during the year ended December 31, 2022.

Subsidiaries

Information regarding subsidiaries is provided in Note 30 to the consolidated financial statements and the business conducted by these subsidiaries is described above in Principal Activities. The Group does not operate any branches outside of the State.

Going Concern

The Directors have a reasonable expectation that the Group has adequate resources to continue in operational existence for the foreseeable future. Accordingly, the Group continues to adopt the going concern basis in preparing the financial statements.

Disclosure of Information to the Auditors

For the purposes of Section 330 of the Companies Act 2014, each of the persons who are Directors at the date of approval of this Annual Report individually confirm that:

- in so far as they are aware, there is no relevant audit information, as defined in section 330, of which the Group's auditors are unaware; and
- that they have taken all the steps that they ought to have taken as a Director in order to make themselves aware of any relevant audit information and to establish that the Group's auditors are aware of such information.

Audit Committee

In accordance with Section 167 of the Companies Act 2014, the Group has an audit committee, which meets the requirements of the Companies Act**.**

Annual Compliance Statement of Trinseo PLC (the Group)

The Directors acknowledge that they are responsible for securing compliance by the Group with its Relevant Obligations as defined in Section 225 of the Companies Act, 2014 (the "Relevant Obligations").

The Directors confirm that they have drawn up and adopted a compliance policy statement setting out the Group's policies that, in the Directors' opinion, are appropriate to the Group respecting compliance with its Relevant Obligations.

The Directors further confirm the Group has put in place appropriate arrangements or structures that are, in the Directors' opinion, designed to secure material compliance with its Relevant Obligations including reliance on the advice of persons employed by the Group and external legal and tax advisers as considered appropriate from time to time and that they have reviewed the effectiveness of these arrangements or structures during the financial year to which this Annual Report relates. The Directors review these compliance arrangements and structures at least annually.

Statement of Directors' Responsibilities

The Directors have elected to prepare the consolidated financial statements in accordance with Section 279 of the Companies Act 2014 ("Companies Act"), which provides that a true and fair view of the assets and liabilities, financial position and profit or loss may be given by preparing the financial statements in accordance with US accounting standards ("US GAAP"), as defined in that section to the extent that the use of those principles in the preparation of the financial statements does not contravene any provision of Part 6 of the Companies Act 2014.

These consolidated financial statements were prepared in accordance with Irish Company Law, to present to the shareholders of the Group and file with the Companies Registration Office in Ireland. Accordingly, these financial statements include disclosures required by the Companies Act in addition to those required under US GAAP. The consolidated financial statements include the accounts of subsidiaries, after elimination of intercompany accounts and transactions. The consolidated financial information presented herein reflects all financial information that, in the opinion of the Directors, is necessary for a fair statement of financial position, profit and loss and cash flows for the periods presented.

Under Irish law, the Directors shall not approve the Group and Company financial statements unless they are satisfied that they give a true and fair view of the Group and Company's assets, liabilities and financial position as at the end of the financial year and the profit or loss of the Group and Company for the financial year.

In preparing these financial statements, the Directors are required to:

- select suitable accounting policies and then apply them consistently;
- make judgements and estimates that are reasonable and prudent;
- state whether the financial statements have been prepared in accordance with applicable accounting standards and identify the standards in question, subject to any material departures from those standards being disclosed and explained in the notes to the financial statements; and
- prepare the financial statements on a going concern basis unless it is inappropriate to presume that the Group and Company will continue in business.

The Directors are responsible for keeping adequate accounting records that are sufficient to:

- correctly record and explain the transactions of the Group and Company;
- enable, at any time, the assets, liabilities, financial position and profit or loss of the Group and Company to be determined with reasonable accuracy; and
- enable the Directors to ensure that the financial statements comply with the Companies Act 2014 and enable those financial statements to be audited.

The Directors are also responsible for safeguarding the assets of the Group and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The Directors are responsible for the maintenance and integrity of the corporate and financial information included on the Group's website. Legislation in Ireland governing the preparation and dissemination of financial statements may differ from legislation in other jurisdictions.

Non-Financial Statement

Trinseo's Business Model

A description of Trinseo's business model can be found under "Principal Activities" within this Annual Report.

Commitment to Environmental, Social, and Governance-Related Business Practices

We recognize sustainability is a long-term strategy that guides our innovation and customer relationships. As evidenced by our 2030 Sustainability Goals, environmental and social responsibility remain at the core of Trinseo. It is intrinsic to who we are and what we do each day, as we create the most cutting-edge products that support our customers' needs while remaining sustainably advantaged. Through Trinseo's sustainable materials, technologies, and solutions, we are able to offer sustainable products that meet our customers' unique needs across a wide range of end markets.

We acknowledge the global environmental challenges within the industries we operate. These issues include climate change, plastic waste in the environment, appropriate management of natural resources including water, a growing need for circular solutions that run counter to consumer behavior, increasing regulations, and more. These outside challenges are changing the consumer landscape and trends that will shape our future. We want to tackle these challenges in an organized and deliberate manner. A description of Trinseo's risks, including those related to environmental, social and governance issues can be found under "Principal Risks and Uncertainties" within this Annual Report.

Building on the work we have done since our formation in 2010, we see tremendous opportunity to work in an innovative, collaborative, and reflective fashion to solve these major issues facing our industry. Our sustainability journey is accelerating to make a meaningful difference in our operations and products to impact our environmental and societal footprint. Through collaboration with our customers, we are developing disruptive innovations and new technologies to support future-oriented solutions that help them meet their sustainability goals.

We strive to live out our core values daily and look to them often to guide our Group forward. They are embedded into the core of our culture, helping to direct our commitment to sustainability, the environment, and the health and safety of our employees. Our core values include:

- Responsible Care®
- Respect & Integrity
- Accountability & Value Creation
- Innovation
- Commitment to Customers

Trinseo is committed to good governance practices, and its Board of Directors (the "Board"), periodically assesses the Group's governance against external standards. As an international, publicly traded company listed on the New York Stock Exchange ("NYSE"), Trinseo is subject to the requirements of the U.S. Securities and Exchange Commission ("SEC") and other regulatory bodies throughout the world.

The Board's Committee on Environmental, Health and Safety ("EH&S"), Sustainability, and Public Policy (the "Committee") assists the Board in fulfilling its oversight responsibilities by assessing the effectiveness of programs and initiatives that support the environment, health and safety, sustainability, corporate social responsibility, risk management, and climate change policies and programs at Trinseo. The Committee, which is chaired by Sandra Beach Lin, also regularly advises the Board on matters related to these topics and reviews, approves, and recommends for adoption the annual Sustainability and Corporate Social Responsibility Report. The Committee also conducts an annual evaluation to improve Committee performance.

The Group's Executive Leadership Team establishes Trinseo's overall annual objectives and priorities, as well as the annual budget and financial plan, which are approved by the Board. While there are changes from year to year, these objectives are typically focused on EH&S, sustainability, financial performance, strategic planning, and organizational effectiveness.

The following is a summary of Trinseo's key policies and actions in the areas of (i) Environmental Matters, (ii) Social and Employee Matters, (iii) Human Rights, and (iv) Bribery and Corruption. These policies and actions aim to confirm Trinseo's risk management in these areas and achieve its goals.

Environmental Matters

Our commitment to protecting the environment and the health and safety of our employees remains central to everything we do. We utilize our Core Values to guide us as we continuously measure our environmental impact and improve the Group's processes, so we may promote resource conservation throughout the life cycles of our products and prevent adverse environmental impacts and waste. Refer to *Environmental, Health, Safety and Product Stewardship* for additional information on environmental matters.

2021 Environmental Reporting

Trinseo monitors and tracks our environmental performance at plants globally, with the goal of continually reducing emissions, waste, water intake, and energy consumption. From 2017 through 2021, Trinseo has reduced:

- Electricity usage by 2%
- Total Greenhouse Gas ("GHG") emissions by 17%
    - Scope 1 GHG emissions by 9%
    - Scope 2 GHG emissions by 21%
- Nitrogen Oxide emission by 22%
- Total chemical emissions by 25%
- Waste by 17%
- Freshwater intake by 12%

From 2020 to 2021, Trinseo has reduced:

- GHG emissions by 5%
- Chemical emissions by 11%
- Volatile organic compounds ("VOC") emissions by 10%
- Electricity usage increased 6% from an increase in production; however, total non-fossil electricity increased by 4%
- Water consumption by 6%

Product Safety & Stewardship

In alignment with the American Chemistry Council's Responsible Care® Product Safety Code, Trinseo has Product Stewards, as well as Regional Product Stewardship Leadership, in every region around the world where our materials are manufactured, transported and sold. They are responsible for defining and supporting regulatory compliance issues and conforming to product regulations and industry standards related to human health and environmental risks, chemical inventories, and product regulatory restrictions.

Through a six-step process, we maintain the integrity of our products over time by:

- Gathering existing scientific information about potential hazards of our product
- Determining likely levels of exposure by considering factors such as product composition, manufacturing practices, and applications
- Evaluating risks to human health and the environment
- Revisiting the product safety process periodically to review best practices and identify and correct information gaps

- Managing and/or reducing risks accordingly
- Documenting conclusions

Climate Strategy

Climate change, particularly regarding extreme weather conditions, rising sea levels, and the emission of greenhouse gases, has a significant impact on our world. We continue to make progress toward our Climate Change Goals as part of Trinseo's 2030 Sustainability Goals. In 2021, Trinseo targeted the reduction of total GHG emissions and emission intensity and was successful in making progress toward achieving that goal due in part to coal power decrease, non-fossil electricity increases, and innovative employee-led projects. Through this multipronged approach, the Group is advancing toward our 2025 milestone of 10% reduction for GHG emission intensity. The Group has also developed a strategic roadmap for addressing decarbonization and has begun work with our supply chain organization to evaluate our Scope 3 emissions in order to start reporting on our holistic climate impact by 2025 in an effort to continue to reduce our climate impact.

Circular Solutions

Circular solutions are one of the most promising opportunities for achieving a future in which our collective actions minimize the impact we have on the world in which we live. Over the years, we have taken significant steps to advance circularity, particularly for polystyrene. As a founding member of Styrenics Circular Solutions — a consortium dedicated to accelerating the transformation of the polystyrene industry and fully realizing the circularity of polystyrene — we are driving the adoption of new technologies to find new methods for polystyrene recycling, creating an infinitely recyclable and sustainable material. The Heathland Acquisition announced at the end of 2021 also represented a significant step to advance circularity by increasing the secured supply of sustainable feedstocks. Heathland is a plastic waste collector and recycler focused on converting PCR and post-industrial ("PIR") PMMA, PC, ABS, polystyrene, and other thermoplastic waste for use in a circular economy. This experience and our expertise in circular solutions establishes us as a forward-thinking partner and a resource to all our customers. Our position is to be an industry leader and pave the way to circular solutions for our customers and the world, contributing to the possibility of a circular economy.

Mass Balance

As part of Trinseo's commitment to sustainable product development, Trinseo has secured Mass Balance certification for seven families of products manufactured in Europe from the International Sustainability & Carbon Certification ("ISCC"): polystyrene, polycarbonate, SB and SA latex, and styrene and copolymers ABS and SAN. Mass balance is a chain of custody model designed to track total amount of input of sustainable raw materials throughout the production cycle and ensure an appropriate allocation to the output of finished goods – thus enabling the tracking of sustainably advantaged materials through complex value chains. It is the first step in the path to circularity as we assess the input of sustainable content through the value chain.

Social & Employee Matters, and Information Security

At Trinseo, we believe in extending beyond our core business and giving back to the communities in which we operate. This belief is ingrained into Trinseo as an organization — just as our materials are ingrained in countless products improving lives globally. We aim to uplift the communities where our employees live and work, while also educating and inspiring the next generation of chemists and engineers in the process. Additionally, we aim to combat climate change through environmental stewardship and responsible operations within these communities.

Our Group's culture has been established over the years and brought to life by the people that are Trinseo. As we look forward, we are taking steps to refine and strengthen our culture by building on our strengths, identifying opportunities for improvement, and reinforcing those attributes that will allow us to progress further along our transformative journey to enhance our position as an innovative solutions provider of sustainable materials.

Trinseo's Code of Business Conduct

As representatives of Trinseo, all employees are expected to uphold our ethical principles of business operations in all matters involving the Group, as outlined by our Code of Business Conduct and supporting policies. The code provides key ethical principles and policies to assist our employees as they conduct business around the world, in conjunction with existing Trinseo policies and standards and the laws, rules, and regulations in countries in which

Trinseo does business. Trinseo's Code of Business Conduct is extended to our suppliers through Trinseo's Supplier Code of Conduct because ethical considerations are part of how we conduct business, and thus we work to select suppliers that mirror our commitment to ethical conduct, global corporate social responsibility, and sustainability. We assess our top 1,500 suppliers on key attributes that are standardized in the Trinseo Supplier Code of Conduct.

Trinseo's Code of Conduct is built upon the foundation of high ethical and business standards, and includes: Respect for Trinseo People, which addresses human rights, diversity and equal opportunity, protection against harassment, workplace health and safety, and privacy and protection of personal data; Protecting the Environment, which covers compliance with EH&S laws; Protection of Trinseo's Assets and Reputation, which highlights conflicts of interest, gifts, records management, and political involvement, among other items; and Integrity in the Marketplace, which provides guidance on competition and fair trade and international trade laws.

Employees are expected to apply the principles and policies detailed above to the daily performance of their business activities, and immediately report any compliance concerns to a supervisor, Human Resources, Trinseo's Chief Compliance Officer, or our ethics compliance hotline, which provides both telephonic and online access. Trinseo has zero tolerance for any reprisal or retaliation against a person who reports a known or suspected violation in good faith.

The Group's Code of Business is available on our website at: https://www.trinseo.com/About/Ethics-and-Compliance/Code-of-Business-Conduct.

Ethics Administration & Training

We take great care to support proper administration of the Trinseo Ethics and Compliance Program. The Ethics and Compliance Committee oversees our approach to this, and includes executive oversight, protection of those reporting potential violations, employee training resources, and an ethics and compliance hotline. The Ethics and Compliance committee is composed of eight senior Trinseo executives and led by our Chief Compliance Officer, and it reports to the Audit Committee of Trinseo's Board of Directors. The Committee reviews, modifies, and updates the Code of Business Conduct and its supporting policies on an ongoing basis, oversees the responses to any ethics or compliance reports or questions, conducts or monitors any investigatory activity, and assists in communication of the Ethics and Compliance Program to employees and the public, helping to ensure a positive compliance culture. Trinseo encourages employees to report any known or suspected ethical or legal violations, and clearly communicates its zero tolerance and disciplinary action for any retaliation against a person who reports in good faith. Trinseo employees can report violations in a wide range of languages through our ethics compliance hotline that allows anonymous reporting via phone or email for individuals inside or outside the Group and is contracted through NAVEX Global.

Ethics and Compliance training is required of all Trinseo employees on a regular basis and is administered through a web-based portal that is available in 13 languages. Further training is conducted in person, and additional modules pertaining to ethics and compliance topics have been periodically added.

Employee Safety

At Trinseo, safety means that every decision we make prioritizes the safety of our people, our communities, and the environment. We recognize that as a global company, we have a responsibility to care for our colleagues, our communities, our customers, and the natural world, with the ultimate goal of achieving zero injuries, spills, or process incidents in our facilities. Our 2021 Safety Reporting included the following results:

- Work-related fatalities – Employees: 0; Contractors: 0
- High-consequence work-related injuries – Employees: 0; Contractors: 0
- Occupational Safety and Health Administration ("OSHA") recordable work-related injuries – Employees: 8; Contractors: 3
- Total hours worked (in millions) – Employees: 5.7; Contractors: 2.1
- Total injury rate* – Employees: 0.28; Contractors: 0.28
- Trinseo's overall injury rate was 0.28, as compared to ACC Member Companies' rate of 0.69**

**As defined by OSHA, number of injuries per 200,000 hours worked, which is the same as the percent of employees injured during in a year*

***Per the American Chemistry Council (ACC) data in 2021*

Our EH&S management system has its roots in Responsible Care ®. Through a carefully built and maintained culture of rigorous investigation, corrective action, and continuous improvement applied over many years, we have delivered a world-class set of internal policies, processes, and procedures.

Trinseo's culture fully embraces and encourages highly interactive and constructive worker and leader interactions through our behavior-based safety program, Safety on Purpose.

Diversity and Equal Employment Opportunity

We are committed to creating and maintaining an inclusive workforce that offers a diversity of perspectives, backgrounds and experience, and creating an environment in which all Trinseo employees have an equal opportunity to reach their potential and contribute fully to the success of the Group. Trinseo provides equal employment opportunity, with a policy to recruit, hire, develop, and promote qualified applicants or employees without regard to race, color, religion, sec, pregnancy, gender identity, sexual orientation, veteran status, national origin, age, disability (mental or physical), or genetic information. We believe our commitment to diversity is reflected in our Board and executive leadership team. As of December 31, 2022, 30% of our Board and 25% of our executive leadership team are women, and two of our Board members self-identify as a member of an underrepresented minority group. Our executive leadership team also represents broad citizenship and geographic diversity.

Anti-Discrimination

All employees can expect to work in a professional environment free from discrimination and are expected to fully comply with the requirements of our Anti-Discrimination Policy. Trinseo does not tolerate actions of harassment or reprisal taken based on an individual's or group of individuals' memberships in a protected classification. Trinseo also does not tolerate retaliation against a person who, in good faith, either reports or participates in any investigation regarding incidents of discrimination or harassment.

Trinseo also follows all applicable laws that provide protection for employees. Violations of this policy will be addressed with corrective action and, if appropriate under the circumstances, disciplinary action up to and including immediate termination of employment.

Complaints or concerns about these policies should be reported immediately to an employee's supervisor, Human Resources, or the Trinseo Chief Compliance Officer, either directly or through the Compliance Hotline. All complaints will receive prompt, appropriate, and confidential review and investigation. Trinseo employees are expected to cooperate if they are involved in the investigation process and maintain appropriate confidentiality about matters being investigated.

Talent Management and Employee Development

We provide opportunities for career development through a combination of training, coaching, and on-the-job experiences. We believe this approach to development provides our employees with the right balance of learning opportunities. Further, we believe that early investment in our employees ensures that our future leaders have the skills and capabilities they will need to be successful within a complex and ever-changing business environment. Trinseo conducts an annual talent review process that assesses our employee's leadership behaviors, attributes, potential, and provides them with input on personal development. We also utilize a goal setting scorecard that enables employees to document and align their goals within a leadership team and across functions, which goals are set against annual Group priorities. Employees are evaluated on their performance versus individual goals and on the Group's performance versus corporate goals (which includes financial and safety metrics). Part of the annual performance review process includes personal assessment goals which are tracked and reviewed throughout the year.

Compensation Policies

Trinseo's process for determination of remuneration consists of two main components: base pay and an annual variable program, and we are committed to ensuring equitable compensation among our employees. As stated above, equal opportunity and diversity are important at Trinseo. We conduct internal reviews to assess fair treatment to determine if our pay practices are being implemented appropriately in all jurisdictions where we operate. In the United States, we also conduct internal reviews with new hires as well as an annual exam to determine the impact of ethnicity on pay decisions.

Corporate Citizenship

Each year, Trinseo hosts our employee Volunteer Days, a several monthslong initiative to bring together hundreds of our employees and their families. Employees around the world support their communities through local volunteer events where they donate their time, talent, and resources. Employees and their families spent over 3,000 hours supporting more than 60 organizations at 21 locations across the globe as part of Trinseo's 2021 Volunteer Days.

Privacy & Information Security

Trinseo is dedicated to maintaining integrated security strategies in order to preserve and protect the personal data and information of our business, employees, and customers. Data security breaches could compromise sensitive information related to business or the personal data of employees, vendors, and customers.

To mitigate the risk of attack from outside the Group as well as internal threats to information security, Trinseo's global information security director conducts risk and vulnerability assessments at operating facilities worldwide. As part of these assessments, employees are provided training on information security. The Group also has a Global Information Security Committee, which has identified and implemented appropriate measures to protect facilities from physical and cyber-attacks, and we continue to assess security vulnerabilities and reinforce security to remain compliant with applicable data security and other data privacy laws and regulations.

In 2021, there were no known or substantiated reportable breaches associated with customer privacy and customer data stored by or for Trinseo.

Human Rights & Modern Slavery

Trinseo believes that respect for the dignity, rights, and ambitions of all people is a cornerstone of business excellence. Trinseo is committed to improving our practices to combat slavery and human trafficking in our supply chains or businesses. We have zero tolerance to slavery and human trafficking. Our policies reflect our commitment to acting ethically and with integrity in our business relationships. We seek to have a positive impact on the reduction of unlawful labor and child exploitation, follow all applicable child labor laws and regulations, and monitor hours of work, rates of pay, and benefits follow applicable laws and regulations.

We consider our risk of exposure to modern slavery to be limited. Our products are used as materials by customers to make other products.

Labor and Human Rights is a priority for our stakeholders, and Trinseo is continuing to develop more in-depth approaches to these topics to deliver on our ethical commitments both within our Group and supply chain, which includes more training and assessment. Trinseo's due diligence processes identify and mitigate risk of human trafficking. As of 2021, this includes a specific training program on Human Trafficking to educate relevant staff. Trinseo has provided Code of Business Conduct training to its employees with respect to the code and its supporting policies. Noncompliance with Trinseo's standards can result in action up to and including dismissal of an employee, contractor, or supplier. The Supplier Code of Conduct, as well as Trinseo's Code of Business Conduct, encourages employees and business partners to report any violations of the code to the confidential hotline.

Trinseo's Procurement team has integrated modern slavery into its supplier screening and assessment process through Achilles, our supplier self-assessment tool; EcoVadis ratings; and our integrated risk management tool.

Bribery and Corruption

As a global organization, Trinseo is subject to laws that govern our international operations, including laws that prohibit bribery and corruption and laws regarding international trade and sanctions. Violations of these laws may result in criminal penalties, sanctions, and/or fines, as well as costly and time-consuming governmental investigations, any or all of which would have an adverse effect on Trinseo's business, financial condition and results of operations and reputation. Trinseo has internal policies and procedures relating to compliance with such laws and regulations, to protect Trinseo from risks associated with the improper acts of employees, agents, business partners, joint venture partners or representatives.

As stated in our Anti-Corruption Policy, Trinseo is committed to conduct all of our business honestly, ethically, and without resort to bribery or questionable inducements to do business of any kind, and in compliance with all anti-corruption laws that apply to Trinseo throughout the world. These laws include but are not limited to U.S. Foreign Corrupt Practices Act ("FCPA"), the U.K. Bribery Act, the Organisation for Economic Co-operation and Development

("OECD") Convention on Combating Bribery of Foreign Public Officials, the U.N. Convention Against Corruption, the Group Law of China and the Supplementary Provisions Regarding Crimes of Corruption and Bribery, and the anti-corruption laws of any other nation in which Trinseo does business.

Trinseo provides annual training to our employees on a variety of anti-corruption and related matters, which are detailed in our Code of Conduct. Additionally, we also provide targeted awareness training addressing applicable trade compliance topics.

The financial statements were approved by the Board of Directors on May 5, 2023 and signed on its behalf by:

/s/ Frank Bozich	/s/ K'Lynne Johnson
Frank Bozich	**K'Lynne Johnson**
Director	Chair

Independent auditors' report to the members of Trinseo PLC

Report on the audit of the financial statements

Opinion

In our opinion:

- Trinseo PLC's Consolidated financial statements and Company financial statements (the "financial statements") give a true and fair view of the Group's and the Company's assets, liabilities and financial position as at December 31, 2022 and of the Group's loss and cash flows for the year then ended;
- the consolidated financial statements have been properly prepared in accordance with accounting principles generally accepted in the United States of America ("US GAAP"), as defined in Section 279 of the Companies Act 2014, to the extent that the use of those principles in the preparation of consolidated financial statements does not contravene any provision of Part 6 of the Companies Act 2014;
- the Company financial statements have been properly prepared in accordance with Generally Accepted Accounting Practice in Ireland (accounting standards issued by the Financial Reporting Council of the UK, including Financial Reporting Standard 102 "The Financial Reporting Standard applicable in the UK and Republic of Ireland" and Irish law); and
- the financial statements have been properly prepared in accordance with the requirements of the Companies Act 2014.

We have audited the financial statements, included within the Directors' Report and financial statements (the "Annual Report"), which comprise:

- the Consolidated Balance Sheet as at December 31, 2022;
- the Company Balance Sheet as at December 31, 2022;
- the Consolidated Statement of Operations for the year then ended;
- the Consolidated Statement of Comprehensive Income (Loss) for the year then ended;
- the Consolidated Statement of Shareholders' Equity for the year then ended;
- the Consolidated Statement of Cash Flows for the year then ended;
- the Company Statement of Changes in Equity for the year then ended;
- the notes to the financial statements, which include a description of the significant accounting policies.

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (Ireland) ("ISAs (Ireland)") and applicable law. Our responsibilities under ISAs (Ireland) are further described in the Auditors' responsibilities for the audit of the financial statements section of our report. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Independence

We remained independent of the Group in accordance with the ethical requirements that are relevant to our audit of the financial statements in Ireland, which includes IAASA's Ethical Standard as applicable to listed entities, and we have fulfilled our other ethical responsibilities in accordance with these requirements.

Our audit approach

Overview

Overall materiality

- $15.0 million (2021: $20.0 million) - Consolidated financial statements.
- Equates to circa 0.3% of net sales (2021: Based on circa 4.5% of income from continuing operations adjusted for acquisition transaction and integration costs, acquisition purchase price hedge loss and restructuring charges).
- $9.3 million (2021: $10.7 million) - Company financial statements.
- Based on circa 0.5% of net assets.

Performance materiality

- $11.3 million (2021: $15.0 million) - Consolidated financial statements.
- $7.0 million (2021: $8.0 million) - Company financial statements.

Audit scope

- We conducted audit work on 21 reporting components. We selected these components due to their size or characteristics and to ensure appropriate audit coverage. An audit of the complete financial information of two reporting components was performed and specified procedures were performed at a further 19 components.
- Additionally, certain centralised Group functions and balances, including treasury, taxation, equity and share-based compensation, goodwill and other intangible assets, pension and post-retirement benefits, litigation and debt were subject to full scope audit procedures.
- Taken together, we obtained coverage of circa 80% of Group net sales, circa 81% of Group total assets and circa 92% of Group total liabilities.

Key audit matters

- Goodwill Impairment Assessment – PMMA Business and Aristech Surfaces Reporting Units

The scope of our audit

As part of designing our audit, we determined materiality and assessed the risks of material misstatement in the financial statements. In particular, we looked at where the directors made subjective judgements, for example in respect of significant accounting estimates that involved making assumptions and considering future events that are inherently uncertain. As in all of our audits we also addressed the risk of management override of internal controls, including evaluating whether there was evidence of bias by the directors that represented a risk of material misstatement due to fraud.

Key audit matters

Key audit matters are those matters that, in the auditors' professional judgement, were of most significance in the audit of the financial statements of the current period and include the most significant assessed risks of material misstatement (whether or not due to fraud) identified by the auditors, including those which had the greatest effect on: the overall audit strategy; the allocation of resources in the audit; and directing the efforts of the engagement team. These matters, and any comments we make on the results of our procedures thereon, were addressed in the context of our audit of the financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters. This is not a complete list of all risks identified by our audit.

Key audit matter	***How our audit addressed the key audit matter***
Goodwill Impairment Assessment - PMMA Business and Aristech Surfaces Reporting Units *Refer to Note 2 "Basis of Preparation and Summary of Significant Accounting Policies – Goodwill and Other Intangible Assets" and Note 10 "Goodwill and Intangible Assets"* As described in Notes 2 and 10 to the consolidated financial statements, the Group's goodwill balance was $410.4 million as of December 31, 2022 and includes $348.9 million related to the Engineered Materials segment. The Engineered Materials segment substantially all relates to the PMMA business reporting unit and Aristech Surfaces reporting unit. Goodwill is tested annually for impairment at the reporting unit level, or more frequently when events or changes in circumstances indicate that the fair value of a reporting unit has more likely than not declined below the carrying value. The estimated fair value of a reporting unit is primarily determined using an income approach (under the discounted cash flow method). As a result of the annual goodwill impairment analysis performed in the fourth quarter, management reduced the carrying value of the PMMA business and Aristech Surfaces reporting units through the recognition of a $226.6 million and $70.5 million non-cash goodwill impairment loss, respectively. Key assumptions and estimates used in the goodwill impairment testing include projections of revenues and operating margin, the estimated weighted average cost of capital ("WACC"), and a projected long-term growth rate. We determined the goodwill impairment assessment of the PMMA business and Aristech Surfaces reporting units to be a key audit matter due to the significant judgement by management when developing the fair value estimate of the PMMA business and Aristech Surfaces reporting units; and the significant assumptions related to projections of revenues and operating margin, and the WACC rates.	We evaluated management's process and tested key controls relating to the goodwill impairment assessment, including controls over the valuation of the PMMA business reporting unit and Aristech Surfaces reporting unit. We evaluated the appropriateness of the discounted cash flow method and tested the completeness and accuracy of the underlying data used in the model. We evaluated the significant assumptions related to projections of revenues and operating margin by considering the current and past performance of the reporting units, the consistency of the assumptions with external market and industry data and whether these assumptions were consistent with evidence obtained in other areas of the audit. With the assistance of our internal valuation specialists, we assessed the reasonableness of the WACC rates using third party source data and we evaluated the reasonableness of the long-term growth rate by considering economic and industry data.

How we tailored the audit scope

We tailored the scope of our audit to ensure that we performed enough work to be able to give an opinion on the financial statements as a whole, taking into account the structure of the Group, the accounting processes and controls, and the industry in which the Group operates.

The Group has six operating segments, namely Engineered Materials, Latex Binders, Base Plastics, Polystyrene, Feedstocks and Americas Styrenics. The operating segments result in a number of reporting units, identified by us as components. Reporting components are structured on a legal entity basis with the majority of these components supported by shared services centres within the Group. Certain other activities, including treasury, taxation, equity and share-based compensation, goodwill and other intangible assets, pension and post-retirement benefits, litigation and debt, are controlled and managed centrally from Corporate within the consolidated Group.

Overall, through the full scope audits of the Group's two largest reporting components, specified procedures performed at 19 components and work performed centrally by the PwC US global engagement team, we obtained coverage of circa 80% of Group net sales, circa 81% of Group total assets and circa 92% of Group total liabilities. In determining our audit scope, we considered the nature and extent of audit work that needed to be performed by us, as the Irish Group engagement team, the PwC US global engagement team, other component auditors within other PwC network firms and other non-network firms. Where the work was performed by PwC US and other component auditors, we determined the level of involvement we needed to have in the audit work of those reporting components to be able to conclude whether sufficient appropriate audit evidence had been obtained as a basis for our opinion on the financial statements as a whole.

We allocated materiality levels and issued instructions to each component auditor. In addition to the audit report from each of the component auditors, we received detailed memoranda of examinations on work performed and relevant findings which supplemented our understanding of the component, its results and the audit findings. Our supervision of the component audit teams included a combination of regular calls with senior team members of the component teams and the review of certain working papers. This, together with additional procedures performed at the Group level, gave us evidence we needed for our opinion on the financial statements as a whole.

Materiality

The scope of our audit was influenced by our application of materiality. We set certain quantitative thresholds for materiality. These, together with qualitative considerations, helped us to determine the scope of our audit and the nature, timing and extent of our audit procedures on the individual financial statement line items and disclosures and in evaluating the effect of misstatements, both individually and in aggregate on the financial statements as a whole.

Based on our professional judgement, we determined materiality for the financial statements as a whole as follows:

	Consolidated financial statements	*Company financial statements*
Overall materiality	$15.0 million (2021: $20.0 million).	$9.3 million (2021: $10.7 million).
	Equates to circa 0.3% of net sales (2021: Based on circa 4.5% of income from continuing operations adjusted for acquisition transaction and integration costs, acquisition purchase price hedge loss and restructuring charges)	Based on circa 0.5% of net assets.
Rationale for benchmark applied	We considered a number of materiality benchmarks including “net sales”, “EBITDA”, “EBITDA adjusted for non recurring charges”, “pre-tax income”, “pre-tax income adjusted for non recurring charges” and a three year average of each of the benchmarks, in calculating our overall materiality level. In considering the materiality levels calculated by reference to the various benchmarks, we considered a materiality level of $15 million to be appropriate which equates to c. 0.3% of net sales. We also considered the reasonableness of the amount of overall materiality calculated by references to the materiality used in the prior year.	The Company is a holding company. Consequently, we consider that net assets is the most relevant measure to reflect the nature of its activities and transactions.

We use performance materiality to reduce to an appropriately low level the probability that the aggregate of uncorrected and undetected misstatements exceeds overall materiality. Specifically, we use performance materiality in determining the scope of our audit and the nature and extent of our testing of account balances, classes of transactions and disclosures, for example in determining sample sizes. Our performance materiality was 75% of overall materiality, amounting to $11.3 million (Group audit) and $7.0 million (Company audit).

In determining the performance materiality, we considered a number of factors - the history of misstatements, risk assessment, aggregation risk and the effectiveness of controls - and concluded that an amount at the upper end of our normal range was appropriate.

We agreed with the Audit Committee that we would report to them misstatements identified during our audit above $1.0 million (Group audit) (2021: $1.5 million) and $0.5 million (Company audit) (2021: $0.5 million) as well as misstatements below that amount that, in our view, warranted reporting for qualitative reasons.

Conclusions relating to going concern

Our evaluation of the directors’ assessment of the Group and Company’s ability to continue to adopt the going concern basis of accounting included:

- obtaining management’s going concern assessment for the period of twelve months from the date on which the financial statements are authorised for issue;
- agreeing the cash flow projections underlying management’s going concern assessment to board approved forecasts, assessing how these forecasts are compiled, and evaluating management’s key assumptions; and
- considering the Group’s and the Company’s liquidity and available financial resources including the cash at bank and in hand and the debt and credit facilities disclosed in Note 12.

Based on the work we have performed, we have not identified any material uncertainties relating to events or conditions that, individually or collectively, may cast significant doubt on the Group's or the Company's ability to continue as a going concern for a period of at least twelve months from the date on which the financial statements are authorised for issue.

In auditing the financial statements, we have concluded that the directors' use of the going concern basis of accounting in the preparation of the financial statements is appropriate.

However, because not all future events or conditions can be predicted, this conclusion is not a guarantee as to the Group's or the Company's ability to continue as a going concern.

Our responsibilities and the responsibilities of the directors with respect to going concern are described in the relevant sections of this report.

Reporting on other information

The other information comprises all of the information in the Directors' Report and financial statements other than the financial statements and our auditors' report thereon. The directors are responsible for the other information. Our opinion on the financial statements does not cover the other information and, accordingly, we do not express an audit opinion or, except to the extent otherwise explicitly stated in this report, any form of assurance thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If we identify an apparent material inconsistency or material misstatement, we are required to perform procedures to conclude whether there is a material misstatement of the financial statements or a material misstatement of the other information. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report based on these responsibilities.

With respect to the Directors' Report, we also considered whether the disclosures required by the Companies Act 2014 (excluding the information included in the "Non Financial Statement" as defined by that Act on which we are not required to report) have been included.

Based on the responsibilities described above and our work undertaken in the course of the audit, ISAs (Ireland) and the Companies Act 2014 require us to also report certain opinions and matters as described below:

- In our opinion, based on the work undertaken in the course of the audit, the information given in the Directors' Report (excluding the information included in the "Non Financial Statement" on which we are not required to report) for the year ended December 31, 2022 is consistent with the financial statements and has been prepared in accordance with the applicable legal requirements.
- Based on our knowledge and understanding of the Group and Company and their environment obtained in the course of the audit, we have not identified any material misstatements in the Directors' Report (excluding the information included in the "Non Financial Statement" on which we are not required to report).

Responsibilities for the financial statements and the audit

Responsibilities of the directors for the financial statements

As explained more fully in the Statement of Directors' Responsibilities set out on page 59, the directors are responsible for the preparation of the financial statements in accordance with the applicable framework and for being satisfied that they give a true and fair view.

The directors are also responsible for such internal control as they determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the directors are responsible for assessing the Group's and the Company's ability to continue as a going concern, disclosing as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate the Group or the Company or to cease operations, or have no realistic alternative but to do so.

Auditors' responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (Ireland) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

Irregularities, including fraud, are instances of non-compliance with laws and regulations. We design procedures in line with our responsibilities, outlined above, to detect material misstatements in respect of irregularities, including fraud. The extent to which our procedures are capable of detecting irregularities, including fraud, is detailed below.

Based on our understanding of the Group and industry, we identified that the principal risks of non-compliance with laws and regulations related to anti-bribery legislation and breaches of environmental and health & safety law, and we considered the extent to which non-compliance might have a material effect on the financial statements. We also considered those laws and regulations that have a direct impact on the preparation of the financial statements such as the Companies Act 2014 and relevant tax legislation. We evaluated management's incentives and opportunities for fraudulent manipulation of the financial statements (including the risk of override of controls), and determined that the principal risks were related to posting inappropriate journal entries to manipulate financial results and potential management bias in accounting estimates. Audit procedures performed by the engagement team included:

- Discussions with the Audit Committee, senior management, the Group's internal and external legal counsel and internal audit in respect of the risk of fraud, any known or suspected instance of fraud or non-compliance with laws and regulations;
- Reading the minutes of meetings of the Board and the Audit Committee;
- Considering the results of reporting from component teams relating to compliance with applicable laws and regulations and procedures performed to address assessed fraud risk;
- Challenging assumptions made by management in its significant accounting estimates, in particular in relation to the goodwill impairment assessment as set out in the key audit matters section;
- Identifying and testing selected journal entries, including manual revenue entries, unusual account combinations and consolidation journals based on our risk assessment; and
- Incorporating elements of unpredictability into our audit approach.

There are inherent limitations in the audit procedures described above. We are less likely to become aware of instances of non-compliance with laws and regulations that are not closely related to events and transactions reflected in the financial statements. Also, the risk of not detecting a material misstatement due to fraud is higher than the risk of not detecting one resulting from error, as fraud may involve deliberate concealment by, for example, forgery or intentional misrepresentations, or through collusion.

Our audit testing might include testing complete populations of certain transactions and balances, possibly using data auditing techniques. However, it typically involves selecting a limited number of items for testing, rather than testing complete populations. We will often seek to target particular items for testing based on their size or risk characteristics. In other cases, we will use audit sampling to enable us to draw a conclusion about the population from which the sample is selected.

A further description of our responsibilities for the audit of the financial statements is located on the IAASA website at:

https://www.iaasa.ie/getmedia/b2389013-1cf6-458b-9b8f-a98202dc9c3a/Description_of_auditors_responsibilities_for_audit.pdf

This description forms part of our auditors' report.

Use of this report

This report, including the opinions, has been prepared for and only for the company's members as a body in accordance with section 391 of the Companies Act 2014 and for no other purpose. We do not, in giving these opinions, accept or assume responsibility for any other purpose or to any other person to whom this report is shown or into whose hands it may come save where expressly agreed by our prior consent in writing.

Other required reporting

Companies Act 2014 opinions on other matters

- We have obtained all the information and explanations which we consider necessary for the purposes of our audit.
- In our opinion the accounting records of the Company were sufficient to permit the Company financial statements to be readily and properly audited.
- The Company Balance Sheet is in agreement with the accounting records.

Other exception reporting

Directors' remuneration and transactions

Under the Companies Act 2014 we are required to report to you if, in our opinion, the disclosures of directors' remuneration and transactions specified by sections 305 to 312 of that Act have not been made. We have no exceptions to report arising from this responsibility.

Prior financial year Non Financial Statement

We are required to report if the Company has not provided the information required by Regulation 5(2) to 5(7) of the European Union (Disclosure of Non-Financial and Diversity Information by certain large undertakings and groups) Regulations 2017 in respect of the prior financial year. We have nothing to report arising from this responsibility.

A. Hayden

Alisa Hayden
for and on behalf of PricewaterhouseCoopers
Chartered Accountants and Statutory Audit Firm
Dublin
6 May 2023

- The maintenance and integrity of the Trinseo PLC website is the responsibility of the directors; the work carried out by the auditors does not involve consideration of these matters and, accordingly, the auditors accept no responsibility for any changes that may have occurred to the financial statements since they were initially presented on the website.
- Legislation in the Republic of Ireland governing the preparation and dissemination of financial statements may differ from legislation in other jurisdictions.

TRINSEO PLC

Consolidated Balance Sheet
(In millions, except per share data)

	December 31, 2022	December 31, 2021
Assets		
Current assets		
Cash and cash equivalents	$ 211.7	$ 573.0
Accounts receivable, net of allowance	586.0	740.2
Inventories	553.6	621.0
Other current assets	39.4	44.3
Total current assets	1,390.7	1,978.5
Noncurrent assets		
Investments in unconsolidated affiliates	$ 252.1	$ 245.0
Property, plant and equipment, net	691.1	719.0
Goodwill	410.4	710.1
Other intangible assets, net	772.0	823.8
Right-of-use assets - operating, net	76.1	85.3
Deferred income tax assets	97.3	77.6
Deferred charges and other assets	67.5	70.1
Total noncurrent assets	2,366.5	2,730.9
Total assets	$ 3,757.2	$ 4,709.4
Liabilities and shareholders' equity		
Current liabilities		
Short-term borrowings and current portion of long-term debt	$ 16.0	$ 18.5
Accounts payable	438.1	590.3
Current lease liabilities - operating	17.1	18.4
Income taxes payable	9.9	52.1
Current provisions	47.1	55.3
Accrued expenses and other current liabilities	161.2	216.0
Total current liabilities	689.4	950.6
Noncurrent liabilities		
Long-term debt, net of unamortized deferred financing fees	2,301.6	2,305.6
Noncurrent lease liabilities - operating	60.2	69.2
Deferred income tax liabilities	59.8	103.2
Noncurrent provisions	191.1	279.4
Other noncurrent obligations	37.8	27.3
Total noncurrent liabilities	2,650.5	2,784.7
Commitments and contingencies (Note 16)		
Shareholders' equity		
Ordinary shares, $0.01 nominal value, 4,000.0 shares authorized (December 31, 2022: 39.2 shares issued and 35.1 shares outstanding; December 31, 2021: 38.9 shares issued and 37.9 shares outstanding)	0.4	0.4
Preferred shares, €0.01 nominal value, 1,000.0 shares authorized (no shares issued or outstanding)	-	-
Deferred ordinary shares, €1.00 nominal value, 0.025 shares authorized (December 31, 2022 and 2021: 0.025 shares issued and outstanding)	-	-
Share premium	10.4	10.4
Other reserves	476.3	457.7
Treasury shares, at cost (December 31, 2022: 4.1 shares; December 31, 2021: 1.0 shares)	(200.0)	(50.0)
Retained earnings	261.5	702.8
Accumulated other comprehensive loss	(131.3)	(147.2)
Total shareholders' equity	417.3	974.1
Total liabilities and shareholders' equity	$ 3,757.2	$ 4,709.4

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

The financial statements were approved by the Board of Directors on May 5, 2023 and signed on its behalf by:

/s/ Frank Bozich
Frank Bozich
Director

/s/ K'Lynne Johnson
K'Lynne Johnson
Chair

TRINSEO PLC

Consolidated Statement of Operations
(In millions, except per share data)

	Year Ended December 31, 2022		Year Ended December 31, 2021	
Net sales	$	4,965.5	$	4,827.5
Cost of sales		4,693.2		4,128.6
Gross profit		272.3		698.9
Selling, general and administrative expenses		398.8		323.4
Equity in earnings of unconsolidated affiliates		102.0		110.7
Impairment and other charges		303.4		43.0
Operating income (loss)		(327.9)		443.2
Interest expense, net		112.9		79.4
Acquisition purchase price hedge loss		—		22.0
Other expense (income), net		(7.2)		9.5
Income (loss) from continuing operations before income taxes		(433.6)		332.3
Provision for (benefit from) income taxes		(41.6)		70.9
Net income (loss) from continuing operations		(392.0)		261.4
Net income (loss) from discontinued operations, net of income taxes		(2.9)		160.4
Net income (loss)	$	(394.9)	$	421.8
Weighted average shares- basic		35.9		38.7
Net income (loss) per share- basic:				
Continuing operations	$	(10.90)	$	6.75
Discontinued operations		(0.08)		4.14
Net income (loss) per share- basic	$	(10.98)	$	10.89
Weighted average shares- diluted		35.9		39.6
Net income (loss) per share- diluted:				
Continuing operations	$	(10.90)	$	6.60
Discontinued operations		(0.08)		4.05
Net income (loss) per share- diluted	$	(10.98)	$	10.65

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

TRINSEO PLC

Consolidated Statement of Comprehensive Income (Loss)
(In millions)

	Year Ended December 31,	
	2022	2021
Net income (loss)	$ (394.9)	$ 421.8
Other comprehensive income (loss), net of tax:		
Cumulative translation adjustments (net of tax of $3.9 and $0.0)	(36.9)	(5.3)
Net gain (loss) on cash flow hedges (net of tax (benefit) of $(3.1) and $0.0)	(9.8)	5.9
Pension and other postretirement benefit plans:		
Prior service credit arising during period (net of tax of $0.0 and $0.0)	0.1	2.2
Net gain (loss) arising during period (net of tax (benefit) of $23.7 and $8.9)	64.9	26.2
Amounts reclassified from accumulated other comprehensive income	(2.4)	9.9
Total other comprehensive income (loss), net of tax	15.9	38.9
Comprehensive income (loss)	$ (379.0)	$ 460.7

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

TRINSEO PLC

Consolidated Statement of Shareholders' Equity
(In millions, except per share data)

	Shares			Shareholders' Equity							
	Ordinary Shares Outstanding	Treasury Shares	Deferred Ordinary Shares	Ordinary Shares	Deferred Ordinary Shares	Share Premium	Other Reserves	Treasury Shares	Accumulated Other Comprehensive Income (Loss)	Retained Earnings (Accumulated Deficit)	Total
Balance at December 31, 2020	38.4	10.4	—	$ 0.5	$ —	$ —	$ 579.6	$ (542.9)	$ (186.1)	$ 718.4	$ 569.5
Net income	—	—	—	—	—	—	—	—	—	421.8	421.8
Other comprehensive income	—	—	—	—	—	—	—	—	38.9	—	38.9
Cancellation of treasury shares	—	(9.9)	—	(0.1)	—	—	(118.7)	524.8	—	(406.0)	—
Impact of Redomiciliation	—	—	—	—	—	9.8	(9.8)	—	—	—	—
Share-based compensation activity	0.5	(0.5)	—	—	—	0.6	6.6	18.1	—	—	25.3
Purchase of treasury shares	(1.0)	1.0	—	—	—	—	—	(50.0)	—	—	(50.0)
Dividends on ordinary shares ($0.80 per share)	—	—	—	—	—	—	—	—	—	(31.4)	(31.4)
Balance at December 31, 2021	37.9	1.0	—	$ 0.4	$ —	$ 10.4	$ 457.7	$ (50.0)	$ (147.2)	$ 702.8	$ 974.1
Net loss	—	—	—	—	—	—	—	—	—	(394.9)	(394.9)
Other comprehensive income	—	—	—	—	—	—	—	—	15.9	—	15.9
Share-based compensation activity	0.3	—	—	—	—	—	18.6	—	—	—	18.9
Purchase of treasury shares	(3.1)	3.1	—	—	—	—	—	(150.0)	—	—	(150.0)
Dividends on ordinary shares ($1.28 per share)	—	—	—	—	—	—	—	—	—	(46.4)	(46.4)
Balance at December 31, 2022	35.1	4.1	—	$ 0.4	$ —	$ 10.4	$ 476.3	$ (200.0)	$ (131.3)	$ 261.5	$ 417.3

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

TRINSEO PLC

Consolidated Statement of Cash Flows
(In millions)

	Year Ended December 31, 2022	2021
Cash flows from operating activities		
Net income (loss)	$ (394.9)	$ 421.8
Less: Net income (loss) from discontinued operations	(2.9)	160.4
Net income (loss) from continuing operations	(392.0)	261.4
Adjustments to reconcile net income (loss) from continuing operations to net cash provided by operating activities - continuing operations		
Depreciation and amortization	236.9	167.5
Amortization of deferred financing fees, issuance discount, and excluded component of hedging instruments	9.3	7.7
Deferred income tax (benefit)	(93.3)	(2.1)
Share-based compensation expense	18.6	15.2
Earnings of unconsolidated affiliates, net of dividends	(7.0)	(25.7)
Unrealized net (gain) loss on foreign exchange forward contracts	23.2	(8.4)
Unrealized net loss on commodity economic swap contracts	6.4	—
Acquisition purchase price hedge (gain) loss	—	22.0
Pension curtailment and settlement (gain) loss	(3.4)	(1.2)
Gain on sale of businesses and other assets	(1.8)	(0.4)
Impairment charges or write-offs	310.2	6.8
Changes in assets and liabilities		
Accounts receivable	129.1	(214.6)
Inventories	31.8	(214.1)
Accounts payable and other current liabilities	(228.2)	349.3
Income taxes payable	(41.7)	42.4
Other assets, net	16.6	(22.1)
Other liabilities, net	31.7	72.3
Cash provided by operating activities - continuing operations	46.4	456.0
Cash provided by (used in) operating activities - discontinued operations	(2.9)	(3.3)
Cash provided by operating activities	43.5	452.7
Cash flows from investing activities		
Capital expenditures	(148.2)	(117.7)
Cash received (paid) for asset or business acquisitions, net of cash acquired ($1.0 and $12.1)	(22.2)	(1,804.0)
Proceeds from the sale of businesses and other assets	5.3	0.2
Proceeds from (payments for) the settlement of hedging instruments	1.9	(14.7)
Cash used in investing activities - continuing operations	(163.2)	(1,936.2)
Cash provided by (used in) investing activities - discontinued operations	(0.8)	396.5
Cash used in investing activities	(164.0)	(1,539.7)
Cash flows from financing activities		
Deferred financing fees	—	(35.4)
Short-term borrowings, net	(17.5)	(14.6)
Purchase of treasury shares	(151.9)	(48.1)
Dividends paid	(47.5)	(21.9)
Proceeds from exercise of option awards	3.0	11.0
Withholding taxes paid on restricted share units	(3.2)	(0.9)
Repurchases and repayments of long-term debt	(16.6)	(10.7)
Net proceeds from issuance of 2028 Term Loan B	—	746.3
Net proceeds from issuance of 2029 Senior Notes	—	450.0
Proceeds from draw on Accounts Receivable Securitization Facility	—	150.0
Repayments of Accounts Receivable Securitization Facility	—	(150.0)
Cash provided by (used in) financing activities	(233.7)	1,075.7
Effect of exchange rates on cash	(7.1)	(4.4)
Net change in cash, cash equivalents, and restricted cash	(361.3)	(15.7)
Cash, cash equivalents, and restricted cash—beginning of period	573.0	588.7
Cash, cash equivalents, and restricted cash—end of period	$ 211.7	$ 573.0
Less: Restricted cash	—	—
Cash and cash equivalents—end of period	$ 211.7	$ 573.0
Supplemental disclosure of cash flow information		
Cash paid for income taxes, net of refunds	$ 98.2	$ 37.2
Cash paid for interest, net of amounts capitalized	$ 103.4	$ 62.4
Accrual for property, plant and equipment	$ 11.3	$ 14.3

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

NOTE 1—ORGANIZATION AND BUSINESS ACTIVITIES

Organization

Trinseo PLC ("Trinseo," and together with its subsidiaries, the "Group") is a public limited company existing under the laws of Ireland under registered number 562693, located at 440 East Swedesford Road, Suite 301, Wayne, PA 19087. On October 8, 2021, the Group's former publicly-traded parent entity, Trinseo S.A., was merged with and into Trinseo PLC, with Trinseo PLC as the surviving entity (the "Redomiciliation"). The Redomiciliation was completed pursuant to the Common Draft Terms of Merger dated as of April 23, 2021 and was approved by shareholders at Trinseo S.A.'s 2021 annual general meeting held on June 10, 2021. As a result of the Redomiciliation, all of Trinseo S.A.'s outstanding ordinary shares, excluding treasury shares, were exchanged on a one-for-one basis for newly issued ordinary shares, par value $0.01 per share, of Trinseo PLC.

Prior to the formation of Trinseo S.A., the Group's business was wholly owned by The Dow Chemical Company (together with its affiliates, "Dow"). In 2010, the Styron business was sold by Dow to investment funds advised or managed by affiliates of Bain Capital Partners, LP (the "Dow Separation"). In 2016, Bain Capital fully divested its ownership in the Group.

Business Activities

The Group is a specialty material solutions provider with a focus on partnering with companies to bring ideas to life in an imaginative, smart, and sustainability-focused manner. The Group has leading market positions in many of the markets in which it competes. The Group's products are incorporated into a wide range of its customers' products throughout the world, including products for automotive applications, consumer electronics, appliances, medical devices, packaging, footwear, carpet, paper and board, building and construction, and wellness applications, among others.

The Group's operations are located in Europe, North America, and Asia Pacific, supplemented by Americas Styrenics, a styrenics joint venture with Chevron Phillips Chemical Company LP. Refer to Note 6 for further information regarding the Group's investment in Americas Styrenics.

The Group has significant manufacturing and production operations around the world, which allow service to its global customer base. As of December 31, 2022, the Group's production facilities included 39 manufacturing plants and one recycling facility at 33 sites across 15 countries, including its joint venture. Additionally, as of December 31, 2022, the Group operated 11 research and development ("R&D") facilities globally, including mini plants, development centers, and pilot coaters.

The Group's Chief Executive Officer, who is the chief operating decision maker, manages the Group's operations under six segments, Engineered Materials, Latex Binders, Base Plastics, Polystyrene, Feedstocks, and Americas Styrenics, as described in Note 20. Beginning in the second quarter of 2021, the Group reported the results of its synthetic rubber business ("Rubber Business") as discontinued operations in the consolidated statements of operations for all periods presented, and therefore it is no longer presented as a separate reportable segment. The sale of the Rubber Business was completed on December 1, 2021. Refer to Note 5 for further information.

NOTE 2—BASIS OF PRESENTATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Presentation and Principles of Consolidation

The accompanying consolidated financial statements as of and for the year ended December 31, 2022, along with the comparative periods are prepared in accordance with Section 279 of the Companies Act 2014 (the "Act"), which provides that a true and fair view of the state of affairs and profit or loss may be given by preparing the financial statements in accordance with accounting principles generally accepted in the United States of America ("GAAP"), as defined in Section 279 of the Act, to the extent that the use of those principles in the preparation of the financial statements does not contravene any provision of the Act or of any regulations made thereunder. The historical consolidated financial statements of Trinseo S.A. for the periods prior to the Redomiciliation as described in Note 1 are considered to be the historical financial statements of the Group.

Consolidated financial statements and notes prepared in accordance with U.S. GAAP were included in the Group's Annual Report on Form 10-K for the year ended December 31, 2022, filed with the U.S. Securities and Exchange Commission ("SEC"). These consolidated financial statements were prepared in accordance with Irish Company Law, to present to shareholders and file with the Companies Registration Office in Ireland. Accordingly, these consolidated financial statements include presentation and disclosures required by Ireland's Companies Act 2014 in addition to those disclosures required under U.S. GAAP.

The consolidated financial statements of the Group contain the accounts of all entities that are controlled and variable interest entities ("VIEs") for which the Group is the primary beneficiary. A VIE is defined as a legal entity that has equity investors that do not have sufficient equity at risk for the entity to support its activities without additional subordinated financial support or, as a group, the holders of the equity at risk lack (i) the power to direct the entity's activities or (ii) the obligation to absorb the expected losses or the right to receive the expected residual returns of the entity. A VIE is required to be consolidated by a company if that company is the primary beneficiary. Refer to Note 12 for further discussion of the Group's Accounts Receivable Securitization Facility, which qualifies as a VIE and is consolidated within the Group's financial statements.

All intercompany balances and transactions are eliminated. Joint ventures over which the Group has the ability to exercise significant influence that are not consolidated are accounted for by the equity method.

Certain prior year amounts have been reclassified to conform to the current year presentation. Throughout this Annual Report, unless otherwise indicated, amounts and activity are presented on a continuing operations basis.

Irish Company Law contains specific requirements for the classification of any liability uncertain as to the amounts at which it will be settled or as to the date on which it will be settled. These liabilities are classified as provisions. Refer to Note 25, "Provisions," of the notes to consolidated financial statements for those liabilities which meet the provision classification requirements under Irish Company Law.

The consolidated financial statements basis have been prepared on a going concern basis. The board has formed a judgement at the time of approving the Consolidated Financial Statements that there is a reasonable expectation that the Group will have adequate resources to continue in operational existence for a period of at least twelve months from the date on which the financial statements are approved for issue. The Group consistently generated positive cash flows during the years ended December 31, 2022 and 2021. The board expects that funds provided by operations, existing cash, cash equivalent, and restricted cash balances, borrowings available under the 2026 Revolving Facility and the Accounts Receivable Securitization Facility will be adequate to meet planned operating and capital expenditures for at least the next 12 months under current operating conditions.

Use of Estimates in Financial Statement Preparation

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. Actual amounts could differ from these estimates.

Concentration of Credit Risk

Financial instruments that potentially subject the Group to concentrations of credit risk consist principally of cash equivalents and accounts receivable. The Group uses major financial institutions with high credit ratings to engage in transactions involving cash equivalents. The Group minimizes credit risk in its receivables by selling products to a diversified portfolio of customers in a variety of markets located throughout the world.

The Group performs ongoing evaluations of its customers' credit and generally does not require collateral. The Group maintains an allowance for doubtful accounts for losses resulting from the inability of specific customers to meet their financial obligations, representing its best estimate of probable credit losses in existing trade accounts receivable. A specific reserve for doubtful receivables is recorded against the amount due from these customers. For all other customers, the Group recognizes reserves for doubtful receivables based on historical experience.

Financial Instruments

The carrying amounts of the Group’s financial instruments, including cash and cash equivalents, accounts receivable, accounts payable, and accrued and other current liabilities, approximate fair value due to their generally short maturities.

The estimated fair values of the Group’s 2028 Term Loan B, 2024 Term Loan B, 2029 Senior Notes, and 2025 Senior Notes and, when outstanding, borrowings under its 2026 Revolving Facility and Accounts Receivable Securitization Facility (all of which are defined in Note 12) are determined using Level 2 inputs within the fair value hierarchy. The carrying amounts of borrowings under the 2026 Revolving Facility and Accounts Receivable Securitization Facility approximate fair value as these borrowings bear interest based on prevailing variable market rates.

At times, the Group manages its exposure to changes in foreign currency exchange rates, where possible, by entering into foreign exchange forward contracts. Additionally, the Group manages its exposure to variability in interest payments associated with its variable rate debt by entering into interest rate swap agreements. The Group also manages its exposure to price fluctuations in commodity prices, where possible, by entering into commodity swap agreements. When outstanding, all derivatives, whether designated in hedging relationships or not, are required to be recorded on the consolidated balance sheets at fair value. The fair value of the derivatives is determined from sources independent of the Group, including the financial institutions which are party to the derivative instruments. The fair value of derivatives also considers the credit default risk of the parties involved.

If the derivative is not designated for hedge accounting treatment, changes in the fair value of the underlying instrument and settlements are recognized in earnings. If the derivative is designated as a fair value hedge, changes in the fair value of the derivative and the hedged item are recognized in earnings. If the derivative is designated as a cash flow hedge, the effective portion of the change in the fair value of the derivative will be recorded in accumulated other comprehensive income or loss (“AOCI”) and will be recognized in the consolidated statements of operations when the hedged item affects earnings or it becomes probable that the forecasted transaction will not occur. If the derivative is designated as a net investment hedge, to the extent it is deemed to be effective, the change in the fair value of the derivative will be recorded within the cumulative translation adjustment account as a component of AOCI and the resulting gains or losses will be recognized in the consolidated statements of operations when the hedged net investment is either sold or substantially liquidated.

As of December 31, 2022, the Group had certain foreign exchange forward contracts and commodity swap agreements outstanding that were not designated for hedge accounting treatment, and certain commodity swap agreements outstanding that were designated as cash flow hedges. As of December 31, 2021, the Group had certain foreign exchange forward contracts outstanding that were not designated for hedge accounting treatment and certain foreign exchange forward contracts and interest rate swap agreements that were designated as cash flow hedges. As of December 31, 2021, the Group also had certain fixed-for-fixed cross currency swaps (“CCS”) outstanding, which swap U.S. dollar principal and interest payments on the Group’s 2025 Senior Notes for euro-denominated payments. The Group’s CCS were designated as a hedge of its net investment in certain European subsidiaries.

Forward contracts, interest rate swaps, cross currency swaps, and commodity swaps are entered into with a limited number of counterparties, each of which allows for net settlement of all contracts through a single payment in a single currency in the event of a default on or termination of any one contract. The Group records these derivative instruments on a net basis, by counterparty within the consolidated balance sheets.

The Group presents the cash receipts and payments from hedging activities in the same category as the cash flows from the items subject to hedging relationships. As the items subject to economic hedging relationships are the Group’s operating assets and liabilities, the related cash flows are classified within operating activities in the consolidated statements of cash flows.

Refer to Notes 13 and 14 for further information on the Group’s derivative instruments and their fair value measurements.

Foreign Currency Translation

For the majority of the Group’s subsidiaries, the local currency has been identified as the functional currency. For remaining subsidiaries, the U.S. dollar has been identified as the functional currency due to the significant influence of the U.S. dollar on their operations. Gains and losses resulting from the translation of various functional currencies into

U.S. dollars are recorded within the cumulative translation adjustment account as a component of AOCI in the consolidated balance sheets. The Group translates asset and liability balances at exchange rates in effect at the end of the period and income and expense transactions at the average exchange rates in effect during the period. Gains and losses resulting from foreign currency transactions are recorded within "Other expense (income), net" in the consolidated statements of operations.

For the years ended December 31, 2022 and 2021, the Group recognized net foreign exchange transaction gains (losses) of $(41.0) million and $(61.9) million, respectively. These amounts exclude the impacts of foreign exchange forward contracts discussed above.

Environmental Matters

Accruals for environmental matters are recorded when it is considered probable that a liability has been incurred and the amount of the liability can be reasonably estimated, based on current law and existing technologies. These accruals are adjusted periodically as assessment and remediation efforts progress, or as additional technical or legal information become available. Accruals for environmental liabilities are recorded within "Noncurrent provisions" in the consolidated balance sheets at undiscounted amounts. As of December 31, 2022 and 2021, there was $3.5 million (adjusted for foreign currency rates) and $4.4 million, respectively, of accrued obligations for environmental remediation or restoration costs, which were recorded at fair value within the opening balance sheets of the 2021 acquisitions of the polymethyl methacrylates ("PMMA") and activated methyl methacrylates ("MMA") businesses (together, the "PMMA business") from Arkema S.A. (the "PMMA Acquisition"), and of Aristech Surfaces LLC, a manufacturer and global provider of PMMA continuous cast and solid surface sheets (the "Aristech Surfaces Acquisition"). Refer to Note 16 for further information on the environmental liabilities related to the PMMA Acquisition and the Aristech Surfaces Acquisition during 2021.

Any costs related to environmental contamination treatment and clean-ups are charged to expense.

Asset Retirement Obligations

The Group recognizes asset retirement obligations in the period in which the liability becomes probable and reasonably estimable. Recognized asset retirement obligations are initially recorded at fair value using discounted estimated cash flows and are adjusted to its present value in subsequent periods as accretion expense is recorded. The corresponding asset retirement costs are capitalized as part of the carrying value of the related long-lived asset and depreciated over the asset's useful life. Refer to Note 16 for further information on the Group's recognized asset retirement obligations, which are related to an obligation to remove certain manufacturing facilities the Group has built on leased land at the end of the contract term.

The Group has identified but not recognized asset retirement obligations related to certain of its manufacturing sites. Legal obligations for these demolition and decommissioning activities, inclusive of environmental costs, exist in connection with the retirement of these assets upon closure of the facilities. The Group plans to continue operations at these facilities indefinitely, and therefore, a reasonable estimate of fair value cannot be determined due to the indeterminate settlement date of the obligations. In the event the Group considers plans to cease operations at these sites, an asset retirement obligation will be reassessed at that time. Settlements of the unrecognized asset retirement obligations are not expected to have a material adverse effect on our financial condition, results of operations or cash flows.

Cash and Cash Equivalents

Cash and cash equivalents generally include time deposits or highly liquid investments with original maturities of three months or less and no material liquidity fee or redemption gate restrictions.

Inventories

Inventories are stated at the lower of cost or net realizable value ("NRV"), with cost being determined on the first-in, first-out ("FIFO") method. NRV is calculated as the estimated selling price less reasonably predictable costs of completion, disposal, and transportation. The Group periodically reviews its inventory for excess or obsolete inventory and will write-down the excess or obsolete inventory value to its NRV, if applicable.

Property, Plant and Equipment

Property, plant and equipment are carried at cost less accumulated depreciation and impairment, if applicable, and are depreciated over their estimated useful lives using the straight-line method.

Expenditures for maintenance and repairs are recorded in the consolidated statements of operations as incurred. Expenditures that significantly increase asset value, extend useful asset lives or adapt property to a new or different use are capitalized. These expenditures include planned major maintenance activities, or turnaround activities, that increase the output of manufacturing facilities or improve production efficiency as compared to pre-turnaround operations. As of December 31, 2022 and 2021, $25.5 million and $28.0 million, respectively, of the Group's net costs related to turnaround activities were capitalized within "Deferred charges and other assets" in the consolidated balance sheets, and are being amortized over the period until the next scheduled turnaround.

The Group periodically evaluates actual experience to determine whether events and circumstances have occurred that may warrant revision of the estimated useful lives of property, plant and equipment. Engineering and other costs directly related to the construction of property, plant and equipment are capitalized as construction in progress until construction is complete and such property, plant and equipment is ready and available to perform its specifically assigned function. The Group also capitalizes interest as a component of the cost of capital assets constructed for its own use. Upon retirement or other disposal, the asset cost and related accumulated depreciation are removed from the accounts and the net amount, less any proceeds, is charged or credited to income.

Impairment and Disposal of Long-Lived Assets

The Group evaluates long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset or asset group may not be recoverable. When undiscounted future cash flows are not expected to be sufficient to recover an asset's carrying amount, the asset is written down to its fair value based on a discounted cash flow analysis utilizing market participant assumptions. Refer to Notes 10 and 14 for further information on the Group's impairment charges recorded for the years ended December 31, 2022 and 2021.

Long-lived assets to be disposed of by sale are classified as held-for-sale and are reported at the lower of carrying amount or fair value less cost to sell, and depreciation is ceased. Long-lived assets to be disposed of in a manner other than by sale are classified as held-and-used until they are disposed. As of December 31, 2022 and 2021, the Group had no assets classified as held-for-sale.

Goodwill and Other Intangible Assets

The Group records goodwill when the purchase price of a business acquisition exceeds the estimated fair value of net identified tangible and intangible assets acquired. Irish company law requires indefinite-lived intangible assets and goodwill to be amortized. However, amortization of indefinite-lived assets and goodwill may not give a true and fair view because not all goodwill and intangible assets decline in value. In addition, since goodwill that does decline in value rarely does so on a straight-line basis, straight-line amortization of goodwill over an arbitrary period may not reflect the economic reality. Therefore, in accordance with U.S. GAAP, goodwill and indefinite-lived intangible assets are not amortized. Rather, the Group assesses the impairment of goodwill and indefinite-lived intangible assets on an annual basis or more frequently if triggering events occur. Goodwill is tested for impairment at the reporting unit level annually, or more frequently when events or changes in circumstances indicate that the fair value of a reporting unit has more likely than not declined below its carrying value. When supportable, the Group employs the qualitative assessment of goodwill impairment prescribed by Accounting Standards Codification ("ASC") 350. Otherwise, the Group primarily utilizes an income approach (under the discounted cash flow method) to calculate the fair value of its reporting units as it is most representative of the value that would be received from a market participant. The annual impairment assessment is completed using a measurement date of October 1. Key assumptions and estimates used in the goodwill impairment testing include projections of revenues and EBITDA, the estimated weighted average cost of capital ("WACC"), and a projected long-term growth rate, all of which are based on data available at the time of the testing. The WACC is calculated incorporating weighted average returns on debt and equity from similar market participants, and therefore, changes in the market which are beyond control of the Group may have an impact on future calculations of estimated fair value. As a result of the fourth quarter impairment testing, the Group recorded a $297.1 million non-cash goodwill impairment loss for the year ended December 31, 2022 related to the PMMA business and Aristech Surfaces reporting units. Refer to Note 10 for further information. No goodwill impairment losses were recorded in the year ended December 31, 2021.

Finite-lived intangible assets, such as developed technology, customer relationships, tradenames, and computer software for internal use are amortized on a straight-line basis over their estimated useful life and are reviewed for impairment or obsolescence if events or changes in circumstances indicate that their carrying amount may not be recoverable. If impaired, intangible assets are written down to fair value based on discounted cash flows. No intangible asset impairment losses were recorded in the years ended December 31, 2022 and 2021.

Acquired developed technology, customer relationships, and tradenames are recorded at fair value upon acquisition and are amortized using the straight-line method over the estimated useful life. The Group determines amortization periods for these assets based on its assessment of various factors impacting estimated useful lives and timing and extent of estimated cash flows of the acquired assets. This includes estimates of expected period of future economic benefit, customer retention rates, and competitive advantage related to existing processes and procedures at the date of acquisition. Significant changes to any of these factors may result in a reduction in the useful life of these assets.

Leases

The Group accounts for its lease arrangements in accordance with ASC 842. The Group has leases for certain of its plant and warehouse sites, office spaces, rail cars, storage facilities, and equipment. The Group determines if an arrangement includes a lease at inception of the contract. Operating lease right-of-use ("ROU") assets and lease liabilities are recognized at the lease commencement date based on the present value of the future minimum lease payments over the lease term. The lease term represents the non-cancelable period of the lease, including any lessee options to renew, extend, or terminate which are considered to be reasonably certain of exercise. As the interest rate implicit in the Group's lease contract is typically not readily available, the Group uses its incremental borrowing rate based on relevant information available at the lease commencement date to determine the weighted average discount rate used to calculate the net present value of lease payments. The Group recognizes lease expense for fixed lease payments on operating leases on a straight-line basis over the lease term, while variable lease payments are recognized as incurred. For leases across all asset classes in which the Group is a lessee, the Group does not separate non-lease components from lease components. Refer to Note 24 for further information on the Group's leases.

Investments in Unconsolidated Affiliates

Investments in unconsolidated affiliates in which the Group has the ability to exercise significant influence (generally, 20% to 50%-owned companies) are accounted for using the equity method. Investments are evaluated for impairment whenever events or changes in circumstances indicate that the carrying amount of the investment may not be recoverable. An impairment loss is recorded whenever a decline in fair value of an investment in an unconsolidated affiliate below its carrying amount is determined to be other-than-temporary.

The Group uses the cumulative earnings approach for presenting distributions received from equity method investees in the consolidated statements of cash flows.

Deferred Financing Fees

Capitalized fees and costs incurred in connection with the Group's recognized debt liabilities are presented in the consolidated balance sheets as a direct reduction from the carrying value of those debt liabilities, consistent with debt discounts. Deferred financing fees related to the Group's revolving debt facilities are included within "Deferred charges and other assets" in the consolidated balance sheets.

Deferred financing fees on the Group's term loan and senior note financing arrangements are amortized using the effective interest method over the term of the respective agreement. Deferred financing fees on the Group's revolving facilities and the Accounts Receivable Securitization Facility are amortized using the straight-line method over the term of the respective facility. Amortization of deferred financing fees is recorded in "Interest expense, net" within the consolidated statements of operations.

Restricted Cash and Cash Equivalents

Restrictions on the Group's cash and cash equivalents are primarily related to customs requirements and are included within "Other current assets" in the consolidated balance sheets. As of December 31, 2022 and 2021, the Group had no amounts recorded as restricted cash and cash equivalents.

Sales

For all material contracts with customers, sales are recognized and control is transferred at a point in time when the Group satisfies the performance obligations according to the terms of the contract, and when title and the risk of loss is passed to the customer. Title and risk of loss varies by region and customer and is determined based upon the purchase order received from the customer and the applicable contractual terms or jurisdictional standards. The Group receives cash equal to the invoice price for most product sales, subject to cash sales incentives with certain customers, with payment terms generally ranging from 10 to 90 days (with an approximate weighted average of 46 days as of December 31, 2022), also varying by segment and region.

Certain of the Group's contracts with customers contain multiple performance obligations, most commonly due to the sale of multiple distinct products. The transaction price within these contracts is allocated between these separate and distinct products based on their stand-alone selling prices, as defined within the contract. The Group's products are typically sold at observable stand-alone sales values, which are used to determine the estimated stand-alone selling price. The stand-alone selling prices of the Group's products are generally based, in part, on the current or forecasted costs of key raw materials, but are often subject to a predetermined lag period for the pass through of these costs. As such, contracts with customers typically include provisions that allow for the changes in stand-alone selling prices to reflect the pass through of changes in raw material costs, often using pricing formulas that utilize commodity indices.

In cases where the Group's transaction price is considered variable at the point of revenue recognition, the 'most likely amount' method is used to estimate the effect of any related uncertainty. In formulating this estimate, the Group considers all historical, current, and forecasted information that is reasonably available to identify a reasonable number of possible consideration amounts. Once the transaction price, including impacts of variable consideration, is estimated, revenue is recognized only to the extent that it is probable that a subsequent change in the estimate would not result in a significant revenue reversal. Furthermore, if the Group is not able to rely on observable stand-alone selling prices, the 'expected cost plus a margin approach' is utilized to estimate the stand-alone selling price of each performance obligation, primarily utilizing historical experience. During the year ended December 31, 2022, the impact of recognizing changes in selling prices related to prior periods was immaterial.

Standard terms of delivery are included in contracts of sale, order confirmation documents, and invoices. Sales and other taxes that the Group collects concurrent with sales-producing activities are excluded from "Net sales" and included as a component of "Cost of sales" in the consolidated statements of operations. Additionally, freight and any directly related costs of transporting finished products to customers are accounted for as fulfillment costs and are also included within "Cost of sales."

The amount of net sales recognized varies with changes in returns, rebates, cash sales incentives, and other allowances offered to customers based on the Group's experience. For arrangements where the period between customer payment and transfer of goods/services is determined to be one year or less at contract inception, the Group applies the practical expedient exception available under ASC 606 and does not adjust the promised amount of consideration under the contract for the effects of a significant financing component. Additionally, the Group's incremental costs of obtaining contracts are expensed as incurred if the amortization period of the assets that the Group otherwise would have recognized is one year or less, and are included within "Selling, general and administrative expenses" in the consolidated statements of operations, pursuant to the practical expedient in ASC 606.

Cost of Sales

The Group classifies the costs of manufacturing and distributing its products as cost of sales. Manufacturing costs include raw materials, utilities, packaging, employee salary and benefits, and fixed manufacturing costs associated with production. Fixed manufacturing costs include such items as plant site operating costs and overhead, production planning, depreciation and amortization, repairs and maintenance, environmental, and engineering costs. Distribution costs include shipping and handling costs. Freight and any directly related costs of transporting finished products to customers are also included within cost of sales. As discussed above, inventory costs are recorded within cost of sales utilizing the FIFO method.

Selling, General and Administrative Expenses

Selling, general and administrative ("SG&A") expenses are generally charged to expense as incurred. SG&A expenses are the cost of services performed by the marketing and sales functions (including sales managers, field sellers, marketing research, marketing communications and promotion and advertising materials) and by administrative functions (including product management, R&D, business management, customer invoicing, human resources, information technology, legal and finance services, such as accounting and tax). Salary and benefit costs, including share-based compensation, for these sales personnel and administrative staff are included within SG&A expenses. R&D expenses include the cost of services performed by the R&D function, including technical service and development, process research including pilot plant operations, and product development. The Group also includes restructuring charges within SG&A expenses.

Total R&D costs included in SG&A expenses were $51.4 million and $63.9 million for the years ended December 31, 2022 and 2021, respectively.

The Group expenses promotional and advertising costs as incurred to SG&A expenses. Total promotional and advertising expenses were $1.2 million and $1.1 million for the years ended December 31, 2022 and 2021, respectively.

Restructuring charges included within SG&A expenses were $54.1 million and $8.6 million for the years ended December 31, 2022 and 2021, respectively. Refer to Note 21 for further information.

Pension and Postretirement Benefits Plans

The Group has various defined benefit plans, under which participants earn a retirement benefit based upon a formula set forth in the plan. The Group also provides certain health care and life insurance benefits to retired employees in the United States. The U.S.-based plans provide health care benefits, including hospital, physicians' services, drug and major medical expense coverage, and life insurance benefits.

Accounting for defined benefit pension plans and other postretirement benefit plans, and any curtailments and settlements thereof, requires various assumptions, including, but not limited to, discount rates, expected rates of return on plan assets, and future compensation growth rates. The Group evaluates these assumptions at least once each year, or as facts and circumstances dictate, and makes changes as conditions warrant.

A settlement is a transaction that is an irrevocable action that relieves the employer (or the plan) of primary responsibility for a pension or postretirement benefit obligation, and that eliminates significant risks related to the obligation and the assets used to effect the settlement. When a settlement occurs, the Group does not record settlement gains or losses during interim periods when the cost of all settlements in a year is less than or equal to the sum of the service cost and interest cost components of net periodic benefit cost for the plan in that year.

Income Taxes

The provision for income taxes is determined using the asset and liability approach of accounting for income taxes. Under this approach, deferred taxes represent the future tax consequences expected to occur when the reported amounts of assets and liabilities are recovered or paid. The Group is, or has been, subject to income taxes in Ireland, Luxembourg, the United States and numerous other foreign jurisdictions, and is subject to audit within these jurisdictions. The provision for income taxes represents income taxes paid or payable for the current year plus the change in deferred taxes during the year. Deferred taxes result from differences between the financial and tax basis of the Group's assets and liabilities and are adjusted for changes in tax rates and tax laws when changes are enacted. For each tax jurisdiction in which the Group operates, deferred tax assets and liabilities are offset against one another and are presented as a single noncurrent amount within the consolidated balance sheets.

Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not that a tax benefit will not be realized. Provision is made for income taxes on unremitted earnings of subsidiaries and affiliates unless such earnings are deemed to be indefinitely invested.

The Group recognizes the financial statement effects of uncertain income tax positions when it is more likely than not, based on the technical merits, that the position will be sustained upon examination. The Group accrues for other tax contingencies when it is probable that a liability to a taxing authority has been incurred and the amount of the contingency can be reasonably estimated. Interest accrued related to unrecognized tax and income tax related penalties are included in the provision for income taxes. The current portion of uncertain income taxes positions is recorded in "Income taxes payable," while the long-term portion is recorded in "Other noncurrent obligations" in the consolidated balance sheets.

Share-based Compensation

Refer to Note 18 for detailed discussion regarding the Group's share-based compensation award programs. In connection with the Group's initial public offering ("IPO"), the Group's board of directors approved the 2014 Omnibus Plan. Since that time, certain equity grants have been awarded, comprised of restricted share units ("RSUs"), options to purchase shares ("option awards"), and performance share units ("PSUs"). Share-based compensation expense recognized in the consolidated financial statements is based on awards that are expected to vest as of their date of grant. The Group's policy election is to recognize forfeitures as incurred.

Compensation costs for the RSUs are measured at the grant date based on the fair value of the award and are recognized ratably as expense over the applicable vesting term. The fair value of RSUs is equal to the fair market value of the Group's ordinary shares based on the closing price on the date of grant. Dividend equivalents accumulate on RSUs during the vesting period, are payable in cash, and do not accrue interest. Award holders have no right to receive the dividend equivalents unless and until the associated RSUs vest.

Compensation costs for the option awards are measured at the grant date based on the fair value of the award and are recognized as expense over the appropriate service period utilizing graded vesting. The fair value for option awards is computed using the Black-Scholes pricing model, which uses inputs and assumptions determined as of the date of grant.

Compensation costs for the PSUs are measured at the grant date based on the fair value of the award, which is computed using a Monte Carlo valuation model, and are recognized ratably as expense over the applicable vesting term. Dividend equivalents accumulate on PSUs during the vesting period, are payable in cash, and do not accrue interest. Award holders have no right to receive the dividend equivalents unless and until the associated PSUs vest.

Treasury Shares

The Group may, from time to time, repurchase its ordinary shares at prevailing market rates. Share repurchases are recorded at cost in "Treasury shares" within shareholders' equity in the consolidated balance sheets.

Deferred Ordinary Shares

The Group has 0.025 million deferred ordinary shares of 1.00 each at par, which are issued and outstanding as of December 31, 2022 and 2021. The deferred ordinary shares are held by nominees in order to meet the Irish statutory minimum capital requirements of an Irish public limited company. The deferred ordinary shares carry no voting rights, are not entitled to receive any dividend or distribution, and do not dilute the economic ownership of Trinseo PLC shareholders.

Share Premium

The difference between the proceeds received on shares issued after the Redomiciliation and the nominal value of the shares is credited to the share premium account.

Recent Accounting Guidance

As of December 31, 2022, there was no recently issued accounting standards which would have a material effect on the Group's consolidated financial statements.

NOTE 3—NET SALES

The following table provides disclosure of net sales to external customers by primary geographical market (based on the location where the sales originated), by segment for the years ended December 31, 2022 and 2021.

Year Ended	Engineered Materials	Latex Binders	Base Plastics	Polystyrene	Feedstocks	Total
December 31, 2022						
United States	$ 521.8	$ 369.7	$ 328.3	$ —	$ 16.5	$ 1,236.3
Europe	364.4	598.4	748.2	741.8	232.0	2,684.8
Asia-Pacific	146.3	280.2	137.1	351.3	—	914.9
Rest of World	11.9	8.2	109.4	—	—	129.5
Total	$ 1,044.4	$ 1,256.5	$ 1,323.0	$ 1,093.1	$ 248.5	$ 4,965.5
December 31, 2021						
United States	$ 302.1	$ 314.1	$ 298.2	$ —	$ 14.3	$ 928.7
Europe	294.9	573.6	942.8	688.7	255.8	2,755.8
Asia-Pacific	151.2	286.6	178.6	430.1	2.3	1,048.8
Rest of World	6.8	9.1	78.3	—	—	94.2
Total	$ 755.0	$ 1,183.4	$ 1,497.9	$ 1,118.8	$ 272.4	$ 4,827.5

NOTE 4—ACQUISITIONS

Acquisition of Heathland B.V.

On January 3, 2022, the Group completed the acquisition of Heathland B.V. (“Heathland”) from Heathland Holding B.V. (“Heathland Holding”), through the purchase of all issued and outstanding shares (the “Heathland Acquisition”). The Heathland Acquisition was completed pursuant to the Sale and Purchase Agreement dated December 3, 2021 (“Heathland Agreement”), by and between the Group and Heathland Holding. Heathland is a leading collector and recycler of post-consumer and post-industrial plastic wastes in Europe. The total purchase price consideration is estimated to be $29.3 million, including an initial cash purchase price of $22.9 million, as well as $6.4 million of contingent cash consideration, representing the fair value of certain earn-out payments. The maximum amount of potential earn-out payments is $6.8 million, which amounts will become payable to Heathland Holding as and when the related performance milestones or thresholds are achieved over the three-year period following the date of acquisition. The Heathland Acquisition was funded through existing cash on hand.

Additionally, the Heathland Agreement includes a service fee of approximately $4.5 million, payable to Heathland Holding contingent upon the continued employment of certain Heathland employees for three years following the acquisition date. The Group has not included this service fee as part of the estimated purchase price and instead will accrue for the service fee as compensation expense over the three-year period in which it is earned.

The Group accounted for the acquisition as a business combination pursuant to ASC 805. In accordance with ASC 805, fair values are assigned to tangible and identifiable intangible assets acquired and liabilities assumed at the acquisition date based on the information that was available as of the acquisition date.

The Group allocated the purchase price of the acquisition to identifiable assets acquired and liabilities assumed based on their estimated fair values as of the acquisition date. The excess of the purchase price over the aggregate fair values was recorded as goodwill. During the year ended December 31, 2022, there were no material changes to the purchase price allocation for the Heathland Acquisition. As of December 31, 2022, the acquisition measurement period for Heathland has ended and the values assigned to the assets acquired and liabilities assumed are final.

The table below summarizes the purchase price allocation for the assets acquired and liabilities assumed, based on their relative fair values, which have been assessed as of the January 3, 2022 acquisition date:

	January 3, 2022
Cash and cash equivalents	$ 1.0
Other current assets	1.2
Other intangible assets [(1)]	
Customer relationships	5.1
Tradenames	0.9
Developed technology	0.2
Other assets	1.0
Total fair value of assets acquired	9.4
Current liabilities	(1.3)
Noncurrent liabilities	(1.6)
Total fair value of liabilities assumed	(2.9)
Net identifiable assets acquired	6.5
Purchase price consideration	29.3
Goodwill [(2)]	$ 22.8

(1) The expected weighted average useful life of the acquired intangible assets are 7 years for customer relationships, tradenames and developed technology.

(2) Goodwill largely consists of strategic and synergistic opportunities resulting from combining Heathland with the Group’s existing businesses and is allocated entirely to the Base Plastics segment. No goodwill related to this acquisition is expected to be deductible for income tax purposes.

Pro forma results of operations information have not been presented as the effect of the acquisition is not material. The operating results of Heathland are included within the Group's consolidated statements of operations since the acquisition date of January 3, 2022 and were not material for the year ended December 31, 2022. Pursuant to GAAP, costs incurred to complete the Heathland Acquisition as well as costs incurred to integrate into the Group’s operations are expensed as incurred. Transaction-related costs incurred, which are included within “Selling, general, and administrative expenses” in the consolidated statements of operations, were not material for the year ended December 31, 2022.

Acquisition of Aristech Surfaces

On September 1, 2021, the Group completed its acquisition of Aristech Surfaces LLC (“Aristech Surfaces”) from SK AA Holdings LLC (“SK AA Holdings”), the sole member of Aristech Surfaces, through purchase of 100% membership interest and intellectual property. The purchase price consideration for the Aristech Surfaces Acquisition was $449.5 million, all of which was paid during the year ended December 31, 2021. Aristech Surfaces is a leading North America manufacturer and global provider of PMMA continuous cast and solid surface sheets, serving the wellness, architectural, transportation and industrial markets, which the Group believes will pair well with its existing Engineered Materials business, inclusive of the PMMA Acquisition completed earlier in 2021, discussed further below. Aristech Surfaces’ products are used for a variety of applications, including the construction of hot tubs, swim spas, counter-tops, signage, bath products and recreational vehicles. Aristech Surfaces results are included within the Engineered Materials segment.

The Group allocated the purchase price of the acquisition to identifiable assets acquired and liabilities assumed based on their estimated fair values as of the acquisition date. Refer to the Group’s Form 10-K filed on February 23, 2022 for further information. During the year ended December 31, 2022, there were no changes to the purchase price allocation for the acquisition of the Aristech Surfaces business. As of September 1, 2022, the acquisition measurement period for the Aristech Surfaces business has ended and the values assigned to the assets acquired and liabilities assumed are final.

Acquisition of the PMMA Business

On May 3, 2021, the Group completed its acquisition of the PMMA business from Arkema S.A., ("Arkema") through the purchase of 100% of the shares of certain subsidiaries of Arkema. The purchase price consideration for the PMMA Acquisition was $1,364.9 million, all of which was paid during the year ended December 31, 2021. PMMA is a transparent and rigid plastic with a wide range of end uses, and is an attractive adjacent chemistry which complements Trinseo's offerings across several end markets including automotive, building & construction, medical and consumer electronics. PMMA business results are included within the Engineered Materials segment.

The Group allocated the purchase price of the acquisition to identifiable assets acquired and liabilities assumed based on their estimated fair values as of the acquisition date. Refer to the Group's Form 10-K filed on February 23, 2022 for further information. During the year ended December 31, 2022, there were no changes to the purchase price allocation for the acquisition of the PMMA business. As of May 3, 2022, the acquisition measurement period for the PMMA business has ended and the values assigned to the assets acquired and liabilities assumed are final.

Unaudited Pro Forma Financial Information

The following unaudited pro forma financial information presents the consolidated results of operations of the Group with the PMMA business and Aristech Surfaces for the years ended December 31, 2021 and 2020, respectively, as if these acquisitions had occurred on January l, 2020. The pro forma results were calculated by combining the results of Trinseo with the PMMA business and Aristech Surfaces but do not include adjustments related to cost savings or other synergies that are anticipated as a result of these acquisitions. Accordingly, these unaudited pro forma results are presented for informational purposes only and are not necessarily indicative of what the actual results of operations would have been if the acquisitions had occurred as of January 1, 2020, nor are they indicative of future results of operations.

	Year Ended December 31, 2021
Net sales	$ 5,162.3
Net income (loss)	$ 498.5
Income (loss) from continuing operations	$ 338.1

NOTE 5—DIVESTITURES AND DISCONTINUED OPERATIONS

On December 1, 2021, the Group completed the divestiture of its Rubber Business to Synthos S.A. and certain of its subsidiaries (together, "Synthos") for a purchase price of $402.4 million, which reflected reductions of approximately $41.6 million for the assumption of pension liabilities by Synthos and $47.0 million for net working capital (excluding inventory) retained by Trinseo. The sale resulted in the recognition of an after-tax gain of $117.8 million. Refer to the Group's Form 10-K filed on February 23, 2022 for more information on the transaction. At closing, the Group and Synthos executed a long-term supply agreement, in which Trinseo will supply Synthos certain raw materials used in the Rubber Business subsequent to the sale. For the years ended December 31, 2022 and 2021, the Group recorded $64.7 million and $5.5 million, respectively, in net sales and $55.3 million and $4.1 million, respectively, in cost of sales related to the supply agreement, which is recorded in continuing operations.

The following table presents consolidated statement of operations information on a continuing basis, the basis on which the consolidated statement of operations is presented, and discontinued operation basis for the years ended December 31, 2022 and 2021, in which the results of the Rubber business are reflected as discontinued operations:

	Year Ended December 31, 2022		
	Continuing Operations	Discontinued Operations	Total
Net sales	$ 4,965.5	$ 0.4	$ 4,965.9
Cost of sales	4,693.2	5.1	4,698.3
Gross profit (loss)	272.3	(4.7)	267.6
Selling, general and administrative expenses	398.8	(0.3)	398.5
Equity in earnings of unconsolidated affiliates	102.0	—	102.0
Impairment and other charges	303.4	—	303.4
Operating income (loss)	(327.9)	(4.4)	(323.3)
Interest expense, net	112.9	—	112.9
Other expense, net	(7.2)	(1.3)	(8.5)
Income before income taxes	(433.6)	(3.1)	(436.7)
Provision for (benefit from) income taxes	(41.6)	(0.2)	(41.8)
Net income (loss)	$ (392.0)	$ (2.9)	$ (394.9)

	Year Ended December 31, 2021		
	Continuing Operations	Discontinued Operations	Total
Net sales	$ 4,827.5	$ 478.9	$ 5,306.4
Cost of sales	4,128.6	408.0	4,536.6
Gross profit	698.9	70.9	769.8
Selling, general and administrative expenses	323.4	21.0	344.4
Equity in earnings of unconsolidated affiliates	110.7	—	110.7
Impairment and other charges	43.0	—	43.0
Operating income	443.2	49.9	493.1
Interest expense, net	79.4	—	79.4
Acquisition purchase price hedge loss	22.0	—	22.0
Other expense, net [1]	9.5	(131.1)	(121.6)
Income before income taxes	332.3	181.0	513.3
Provision for income taxes	70.9	20.6	91.5
Net income	$ 261.4	$ 160.4	$ 421.8

(1) Amount as of December 31, 2021 includes the $133.6 million gain on sale.

NOTE 6—INVESTMENTS IN UNCONSOLIDATED AFFILIATES

During the year ended December 31, 2022, the Group had one joint venture: Americas Styrenics, a styrene and polystyrene joint venture with Chevron Phillips Chemical Company LP. Investments held in unconsolidated affiliates in which the Group has the ability to exercise significant influence (generally, 20% to 50%-owned companies) are accounted for by the equity method. The results of Americas Styrenics are included within its own reporting segment.

Equity in earnings from unconsolidated affiliates was $102.0 million and $110.7 million for the years ended December 31, 2022 and 2021, respectively.

The Group's unconsolidated affiliates are privately held companies; therefore, quoted market prices for their equity interests are not available. The summarized financial information of the Group's unconsolidated affiliates is shown below.

	December 31,	
	2022	2021
Current assets	$ 426.7	$ 447.7
Noncurrent assets	250.2	254.2
Total assets	$ 676.9	$ 701.9
Current liabilities	$ 153.8	$ 193.6
Noncurrent liabilities	29.6	31.4
Total liabilities	$ 183.4	$ 225.0

	Year Ended December 31,	
	2022	2021
Sales	$ 2,059.9	$ 1,822.3
Gross profit	$ 268.8	$ 253.8
Net income	$ 204.0	$ 199.0

There were no sales to unconsolidated affiliates for the years ended December 31, 2022 and 2021. Purchases from unconsolidated affiliates were $80.4 million and $73.9 million for the years ended December 31, 2022 and 2021, respectively.

As of December 31, 2022 and 2021, respectively, there were no amounts due from unconsolidated affiliates included in "Accounts receivable, net of allowance" and $3.9 million and $6.1 million due to unconsolidated affiliates was included in "Accounts payable" in the consolidated balance sheets.

As of December 31, 2022 and 2021, respectively, the Group's investment in Americas Styrenics was $252.1 million and $245.0 million, which was $5.4 million and $6.7 million greater than the Group's 50% share of Americas Styrenics' underlying net assets. These amounts represent the difference between the book value of assets held by the joint venture and the Group's 50% share of the total recorded value of the joint venture's assets, inclusive of certain adjustments to conform with the Group's accounting policies. This difference is being amortized over a weighted average remaining useful life of approximately 2.1 years as of December 31, 2022. The Group received dividends from Americas Styrenics of $95.0 million and $85.0 million for the years ended December 31, 2022 and 2021, respectively.

NOTE 7—ACCOUNTS RECEIVABLE

Accounts receivable consisted of the following:

	December 31,	
	2022	2021
Trade receivables	$ 507.9	$ 659.1
Non-income tax receivables	50.9	53.9
Other receivables	34.5	31.3
Less: allowance for doubtful accounts	(7.3)	(4.1)
Total	$ 586.0	$ 740.2

For the years ended December 31, 2022 and 2021, the Group recognized bad debt expense (benefit) of $3.4 million and $(1.5) million, respectively.

NOTE 8—INVENTORIES

Inventories consisted of the following:

	December 31, 2022	December 31, 2021
Finished goods	$ 218.4	$ 279.2
Raw materials and semi-finished goods	295.6	303.9
Supplies	39.6	37.9
Total	$ 553.6	$ 621.0

NOTE 9—PROPERTY, PLANT AND EQUIPMENT

Property, plant and equipment consisted of the following:

	Land	Land and waterway improvements	Buildings	Machinery and Equipment	Leasehold Interest	Other Property[(1)]	Construction in Progress	Total Tangible Assets
Cost:								
At December 31, 2021	$ 86.1	$ 21.9	$ 145.7	$ 874.5	$ 39.8	$ 51.9	$ 55.6	$ 1,275.5
Acquisitions and Additions	-	0.5	4.5	37.9	-	51.7	93.6	188.2
Disposals	(4.9)	(0.3)	(8.4)	(3.0)	(0.6)	(0.1)	(54.0)	(71.3)
Currency translation	(2.4)	(0.5)	(3.1)	(24.5)	(2.8)	(0.5)	1.3	(32.5)
At December 31, 2022	$ 78.8	$ 21.6	$ 138.7	$ 884.9	$ 36.4	$ 103.0	$ 96.5	$ 1,359.9
Accumulated depreciation:								
At December 31, 2021	$ -	$ (10.0)	$ (39.5)	$ (455.4)	$ (21.3)	$ (30.3)	$ -	$ (556.5)
Depreciation expense	-	(1.3)	(12.9)	(77.8)	(2.1)	(42.4)	-	(136.5)
Disposals	-	-	0.1	2.4	-	0.1	-	2.6
Currency translation	-	0.3	1.9	17.0	1.6	0.8	-	21.6
At December 31, 2022	$ -	$ (11.0)	$ (50.4)	$ (513.8)	$ (21.8)	$ (71.8)	$ -	$ (668.8)
Net book value:								
At December 31, 2021	$ 86.1	$ 12.0	$ 106.2	$ 419.1	$ 18.5	$ 21.6	$ 55.6	$ 719.0
At December 31, 2022	$ 78.8	$ 10.6	$ 88.3	$ 371.1	$ 14.6	$ 31.2	$ 96.5	$ 691.1

(1) Includes right-of-use assets related to the Group's finance leases. Refer to Note 24 for additional information.

NOTE 10—GOODWILL AND INTANGIBLE ASSETS

Goodwill

The following table shows the annual changes in the carrying amount of goodwill, by segment, from December 31, 2021 through December 31, 2022:

	Engineered Materials	Latex Binders	Base Plastics	Polystyrene	Feedstocks	Americas Styrenics	Total
Balance at December 31, 2020	$ 16.0	$ 17.1	$ 24.2	$ 4.8	$ —	$ —	$ 62.1
Acquisitions/Divestitures (Note 4)	668.0	—	—	—	—	—	668.0
Foreign currency impact	(16.7)	(1.2)	(1.8)	(0.3)	—	—	(20.0)
Balance at December 31, 2021	$ 667.3	$ 15.9	$ 22.4	$ 4.5	$ —	$ —	$ 710.1
Acquisitions (Note 4)	—	—	22.8	—	—	—	22.8
Impairment losses	(297.1)	—	—	—	—	—	(297.1)
Foreign currency impact	(21.3)	(1.1)	(2.7)	(0.3)	—	—	(25.4)
Balance at December 31, 2022	$ 348.9	$ 14.8	$ 42.5	$ 4.2	$ —	$ —	$ 410.4

Goodwill impairment testing is performed annually as of October 1, or more frequently when events or changes in circumstances indicate that the fair value of a reporting unit has more likely than not declined below the carrying value. Refer to Note 2 for further information. In the year ended December 31, 2022, the Group performed its annual impairment test for goodwill and determined that the PMMA business and Aristech Surfaces carrying value of their net assets exceeded fair value, resulting in an impairment of $297.1 million, discussed further below. The estimated fair values of all other reporting units was in excess of the carrying value. The Group concluded there were no goodwill impairments or triggering events for the year ended December 31, 2021.

As noted within Note 4, in the year ended December 31, 2021, the Group completed the PMMA Acquisition and Aristech Surfaces Acquisition, each of which represents a separate reporting unit within the Engineered Materials segment. As a result of the Group's fourth quarter impairment testing, an impairment charge was taken primarily due to the continuation of the challenging macroeconomic environment experienced in 2022 into the fourth quarter of 2022, including significantly lower demand for building & construction and wellness applications, which led to lower operating results including slower growth projections, and a prolonged drop in market capitalization, as well as an increase in the WACC. During the year ended December 31, 2022, the Group reduced the carrying value of the PMMA business and Aristech Surfaces reporting units through the recognition of a $226.6 million and $70.5 million non-cash goodwill impairment loss, respectively. These charges are recorded within "Impairment and other charges" on the consolidated statement of operations and are allocated to the Engineered Materials segment. These reporting units may be at risk for future impairment due to the remaining fair value being equal to carrying value as a result of the recorded impairment. Should the conditions resulting in the impairment persist, or other events occur indicating that the estimated future cash flows of these reporting units have declined, the Group may be required to record future non-cash impairment charges related to goodwill.

As of December 31, 2022, the reported balance of goodwill included accumulated impairment losses of $297.1 million in the Engineered Materials segment. There were no accumulated goodwill impairment losses as of December 31, 2021 in any of the Group's segments.

Other Intangible Assets

The following table provides information regarding the Group's other intangible assets as of December 31, 2022 and 2021:

	Estimated Useful Life (Years)	December 31, 2022 Gross Carrying Amount	December 31, 2022 Accumulated Amortization	December 31, 2022 Net	December 31, 2021 Gross Carrying Amount	December 31, 2021 Accumulated Amortization	December 31, 2021 Net
Developed Technology	7 - 15	$ 306.4	$ (138.2)	$ 168.2	$ 321.4	$ (119.3)	$ 202.1
Customer Relationships	7 - 13	479.5	(60.6)	418.9	477.1	(23.4)	453.7
Software	5 - 10	241.8	(118.0)	123.8	162.3	(93.8)	68.5
Software in development	N/A	8.8	—	8.8	39.7	—	39.7
Tradenames	10 - 16	51.3	(5.8)	45.5	53.0	(2.1)	50.9
Other	1 - 5	10.5	(3.7)	6.8	12.4	(3.5)	8.9
Total		$ 1,098.3	$ (326.3)	$ 772.0	$ 1,065.9	$ (242.1)	$ 823.8

Amortization expense related to finite-lived intangible assets totaled $93.6 million and $71.8 million for the years ended December 31, 2022 and 2021, respectively.

The following table details the Group's estimated amortization expense for the next five years, excluding any amortization expense related to software currently in development:

Estimated Amortization Expense for the Next Five Years				
2023	2024	2025	2026	2027
$ 95.2	$ 85.7	$ 77.0	$ 71.7	$ 70.4

The Group's other intangible assets consisted of the following as of December 31, 2022 and 2021:

	Developed Technology	Customer Relationships	Software	Software in development	Tradenames	Other	Total Intangible Assets
Cost:							
At December 31, 2021	$ 321.4	$ 477.1	$ 162.3	$ 39.7	$ 53.0	$ 12.4	$ 1,065.9
Acquisitions and additions	5.0	4.8	81.4	44.5	0.8	-	136.5
Divestitures and disposals	-	-	-	(71.9)	-	-	(71.9)
Impairments	-	-	-	-	-	-	-
Currency translation	(20.0)	(2.4)	(1.9)	(3.5)	(2.5)	(1.9)	(32.2)
At December 31, 2022	$ 306.4	$ 479.5	$ 241.8	$ 8.8	$ 51.3	$ 10.5	$ 1,098.3
Accumulated depreciation:							
At December 31, 2021	$ (119.3)	$ (23.4)	$ (93.8)	$ -	$ (2.1)	$ (3.5)	$ (242.1)
Amortization expense	(27.6)	(37.2)	(25.0)	-	(3.7)	(0.4)	(93.9)
Divestitures and disposals	-	-	-	-	-	-	-
Impairments	-	-	-	-	-	-	-
Currency translation	8.7	-	0.8	-	-	0.2	9.7
At December 31, 2022	$ (138.2)	$ (60.6)	$ (118.0)	$ -	$ (5.8)	$ (3.7)	$ (326.3)
Net book value:							
At December 31, 2021	$ 202.1	$ 453.7	$ 68.5	$ 39.7	$ 50.9	$ 8.9	$ 823.8
At December 31, 2022	$ 168.2	$ 418.9	$ 123.8	$ 8.8	$ 45.5	$ 6.8	$ 772.0

NOTE 11—ACCOUNTS PAYABLE

Accounts payable consisted of the following:

	December 31,			
	2022		2021	
Trade payables	$	365.3	$	516.8
Other payables		72.8		73.5
Total	$	438.1	$	590.3

NOTE 12—DEBT

Refer to discussion below for details and definitions of the Group's debt facilities. The Group was in compliance with all debt related covenants as of December 31, 2022 and 2021.

			December 31, 2022					
	Interest Rate as of December 31, 2022	Maturity Date	Carrying Amount		Unamortized Deferred Financing Fees [1]		Total Debt, Less Unamortized Deferred Financing Fees	
Senior Credit Facility								
2024 Term Loan B	6.384%	September 2024	$	663.4	$	(5.1)	$	658.3
2028 Term Loan B	6.884%	May 2028		735.9		(14.4)		721.5
2026 Revolving Facility[2]	Various	May 2026		—		—		—
2029 Senior Notes	5.125%	April 2029		447.0		(12.9)		434.1
2025 Senior Notes	5.375%	September 2025		500.0		(3.7)		496.3
Accounts Receivable Securitization Facility[3]	Various	November 2024		—		—		—
Other indebtedness	Various	Various		7.4		—		7.4
Total debt			$	2,353.7	$	(36.1)	$	2,317.6
Less: current portion[4]								(16.0)
Total long-term debt, net of unamortized deferred financing fees							$	2,301.6

			December 31, 2021					
	Interest Rate as of December 31, 2021	Maturity Date	Carrying Amount		Unamortized Deferred Financing Fees[1]		Total Debt, Less Unamortized Deferred Financing Fees	
Senior Credit Facility								
2024 Term Loan B	2.104%	September 2024	$	670.4	$	(8.0)	$	662.4
2028 Term Loan B	2.604%	May 2028		742.8		(17.0)		725.8
2026 Revolving Facility[2]	Various	May 2026		—		—		—
2029 Senior Notes	5.125%	April 2029		450.0		(14.7)		435.3
2025 Senior Notes	5.375%	September 2025		500.0		(5.0)		495.0
Accounts Receivable Securitization Facility[3]	Various	November 2024		—		—		—
Other indebtedness	Various	Various		5.6		—		5.6
Total debt			$	2,368.8	$	(44.7)	$	2,324.1
Less: current portion[4]								(18.5)
Total long-term debt, net of unamortized deferred financing fees							$	2,305.6

(1) This caption does not include unamortized deferred financing fees of $1.0 million and $1.4 million as of December 31, 2022 and 2021, respectively, related to the Group's revolving facilities, which are included within "Deferred charges and other assets" on the consolidated balance sheets.

(2) As of December 31, 2022, under the 2026 Revolving Facility, the Group had a capacity of $375.0 million and funds available for borrowing of $354.7 million (net of $20.3 million outstanding letters of credit). Additionally, the Group is required to pay a quarterly commitment fee in respect of any unused commitments under this facility equal to 0.375% per annum.

(3) As of December 31, 2022, this facility had a borrowing capacity of $150.0 million, and the Group had approximately $150.0 million of funds available for borrowing under this facility, based on the pool of eligible accounts receivable.

(4) As of December 31, 2022 and 2021, the current portion of long-term debt was primarily related to $14.5 million of the scheduled future principal payments on both the 2024 Term Loan B and 2028 Term Loan B.

Total interest expense, net recognized during the years ended December 31, 2022 and 2021, was $112.9 million and $79.4 million, respectively, of which $9.3 million and $7.7 million, respectively, represented amortization of deferred financing fees and debt discounts. Total accrued interest on outstanding debt as of December 31, 2022 and 2021 was $13.3 million and $4.8 million, respectively, excluding the impact of the CCS (see Note 13). Accrued interest is recorded within "Accrued expenses and other current liabilities" on the consolidated balance sheets.

2029 Senior Notes

On March 24, 2021, Trinseo Materials Operating S.C.A. and Trinseo Materials Finance, Inc. (together, the "Issuers"), each an indirect, wholly-owned subsidiary of the Group, executed an indenture (the "2021 Indenture") pursuant to which they issued $450.0 million aggregate principal amount of 5.125% senior notes due 2029 (the "2029 Senior Notes") in a 144A private transaction exempt from the registration requirements of the Securities Act of 1933, as amended. Interest on the 2029 Senior Notes is payable semi-annually on February 15 and August 15 of each year, commencing on August 15, 2021. The 2029 Senior Notes mature on April 1, 2029. The net proceeds from the 2029 Senior Notes offering were used as a portion of the funding needed for the PMMA Acquisition, in addition to fees and expenses related to the offering and the PMMA Acquisition. The gross proceeds from the 2029 Senior Notes offering were released upon satisfaction of certain escrow release conditions, including closing of the PMMA Acquisition, which was completed on May 3, 2021.

At any time prior to April 1, 2024, the Issuers may redeem the 2029 Senior Notes in whole or in part, at their option, at a redemption price equal to 100% of the principal amount of such notes plus the relevant applicable premium as of, and accrued and unpaid interest to, but not including, the redemption date. At any time and from time to time after April 1, 2024, the Issuers may redeem the 2029 Senior Notes, in whole or in part, at a redemption price equal to the percentage of principal amount set forth below plus accrued and unpaid interest, if any, on the notes redeemed to, but not including, the redemption date:

12-month period commencing April 1 in Year	Percentage
2024	102.563 %
2025	101.281 %
2026 and thereafter	100.000 %

At any time prior to April 1, 2024, the Issuers may redeem up to 40% of the aggregate principal amount of the 2029 Senior Notes at a redemption price equal to 105.125%, plus accrued and unpaid interest to, but not including, the redemption date, with the aggregate gross proceeds from certain equity offerings.

The 2029 Senior Notes are the Issuers' senior unsecured obligations and rank equally in right of payment with all of the Issuers' existing and future indebtedness that is not expressly subordinated in right of payment thereto. The 2029 Senior Notes will be senior in right of payment to any future indebtedness that is expressly subordinated in right of payment thereto and effectively junior to (a) the Issuers' existing and future secured indebtedness, including the Group's accounts receivable facility and the Issuers' Credit Facility, to the extent of the value of the collateral securing such indebtedness and (b) all existing and future liabilities of the Issuers' non-guarantor subsidiaries.

The 2021 Indenture contains customary covenants, including restrictions on the Issuers' and certain of its subsidiaries' ability to incur additional indebtedness and guarantee indebtedness; pay dividends on, redeem or repurchase capital stock; make investments; prepay certain indebtedness; create liens; enter into transactions with the Issuers' affiliates; designate the Issuers' subsidiaries as Unrestricted Subsidiaries (as defined in the 2021 Indenture); and consolidate, merge, or transfer all or substantially all of the Issuers' assets. The covenants are subject to a number of exceptions and qualifications. Certain of these covenants, excluding without limitation those relating to transactions with the Issuers' affiliates and consolidation, merger, or transfer of all or substantially all of the Issuers' assets, will be suspended during any period of time that (1) the 2029 Senior Notes have Investment Grade Status (as defined in the 2021 Indenture) and (2) no default has occurred and is continuing under the 2021 Indenture. In the event that the 2029 Senior Notes are downgraded to below an Investment Grade Status, the Issuers and certain subsidiaries will again be subject to the suspended covenants with respect to future events. As of December 31, 2022, the Group was in compliance with all debt covenant requirements under the 2021 Indenture.

Total fees incurred in connection with the issuance of the 2029 Senior Notes were $15.9 million, which were capitalized and recorded within "Long-term debt, net of unamortized deferred financing fees" on the consolidated balance sheet, and are being amortized over the eight-year term of the 2029 Senior Notes using the effective interest method.

Senior Credit Facility

2022 Revolving Facility

On September 6, 2017, the Issuers entered into a senior secured credit agreement (the "Credit Agreement"), which provides senior secured financing of up to $1,075.0 million (the "Senior Credit Facility"). The Senior Credit Facility provides for senior secured financing consisting of a (i) $375.0 million revolving credit facility, with a $25.0 million swingline subfacility and a $35.0 million letter of credit subfacility maturing in September 2022 (the "2022 Revolving Facility") and a (ii) $700.0 million senior secured term loan B facility maturing in September 2024 (the "2024 Term Loan B"). Amounts under the 2022 Revolving Facility are available in U.S. dollars and euros.

Fees incurred in connection with the issuance of the 2024 Term Loan B were $12.3 million, of which $11.1 million were capitalized along with the remaining $8.1 million of unamortized deferred financing fees from the Group's former term loan facility and recorded within "Long-term debt, net of unamortized deferred financing fees" on the consolidated balance sheets. The capitalized fees are being amortized over the seven-year term of the 2024 Term Loan B using the effective interest method.

Fees incurred in connection with the issuance of the 2022 Revolving Facility were $0.8 million, which were capitalized and recorded within "Deferred charges and other assets" on the consolidated balance sheets, and are being amortized along with the remaining $4.0 million of unamortized deferred financing fees from the Group's former revolving credit facility over the five-year term of the 2022 Revolving Facility using the straight-line method.

As of December 31, 2021, the 2024 Term Loan B bears an interest rate of the London Interbank Offered Rate ("LIBOR") plus 2.00%, subject to a 0.00% LIBOR floor, which has been the effective rate since May 22, 2018, when the Issuers repriced the interest rate from the initial rate of LIBOR plus 2.50%, subject to a 0.00% LIBOR floor. The repricing did not affect any of the other terms of the 2024 Term Loan B. Fees incurred in connection with the repricing were $1.1 million, of which $0.5 million were expensed and included within "Other expense (income), net" in the consolidated statements of operations during the year ended December 31, 2018 and the remaining $0.6 million were capitalized and recorded within "Long-term debt, net of unamortized deferred financing fees" on the consolidated balance sheets. The capitalized fees associated with the repricing are being amortized along with the remaining unamortized deferred financing fees related to the 2024 Term Loan B over its original seven-year term.

The 2024 Term Loan B requires scheduled quarterly payments in amounts equal to 0.25% of the original principal amount of the 2024 Term Loan B, with the balance to be paid at maturity. As of December 31, 2022 and 2021, $7.0 million of the scheduled future payments related to the 2024 Term Loan B were classified as current debt on the Group's consolidated balance sheets.

Loans under the 2022 Revolving Facility, at the Borrowers' option, may be maintained as (a) LIBOR loans, which bear interest at a rate per annum equal to LIBOR plus the applicable margin (as defined in the Credit Agreement), if applicable, or (b) base rate loans which bear interest at a rate per annum equal to the base rate plus the applicable margin (as defined in the Credit Agreement).

The Senior Credit Facility is collateralized by a security interest in substantially all of the assets of the Borrowers, and the guarantors thereunder, including certain foreign subsidiaries organized in the United States, The Netherlands, Hong Kong, Singapore, Ireland, Luxembourg, and Switzerland.

The Senior Credit Facility requires the Borrowers and their restricted subsidiaries to comply with customary affirmative, negative, and financial covenants, including limitations on their abilities to incur liens; make certain loans and investments; incur additional debt (including guarantees or other contingent obligations); merge, consolidate liquidate or dissolve; transfer or sell assets; pay dividends and other distributions to shareholders or make certain other restricted payments; enter into transactions with affiliates; restrict any restricted subsidiary from paying dividends or making other distributions or agree to certain negative pledge clauses; materially alter the business they conduct; prepay certain other indebtedness; amend certain material documents; and change their fiscal year.

2026 Revolving Facility

On May 3, 2021, the Issuers entered into (i) an amendment to the existing credit agreement dated as of September 6, 2017 in which the Issuers borrowed a new tranche of term loans in an aggregate amount of $750.0 million senior secured term loan B facility maturing in May 2028 (the "2028 Term Loan B"), used to finance a portion of the purchase price of the PMMA Acquisition, and (ii) an amendment to the existing credit agreement, pursuant to which the existing revolving credit facility has been refinanced with a new revolving credit facility in an aggregate amount of $375.0 million, with a $25.0 million swingline subfacility and a $35.0 million letter of credit subfacility, maturing in May 2026. Amounts under the 2026 Revolving Facility are available in U.S. dollars and euros. The terms under the 2026 Revolving Facility are substantially unchanged from the 2022 Revolving Facility. As a result of amending the revolving credit facility, during the year ended December 31, 2021, the Group recognized a $0.5 million loss on extinguishment of long-term debt related to the write-off of a portion of the existing unamortized deferred financing fees. This amount has been recorded with "Other expense (income), net" in the consolidated statement of operations.

The 2028 Term Loan B bears an interest rate of LIBOR plus 2.50%, subject to a 0.00% LIBOR floor, and was issued at a 0.5% original issue discount. Further, the 2028 Term Loan B requires scheduled quarterly payments in amounts equal to 0.25% of the original principal amount of the 2028 Term Loan B, with the balance to be paid at maturity. As of December 31, 2022, $7.5 million of the scheduled future payments related to the 2028 Term Loan B were classified as current debt on the Group's consolidated balance sheets.

The 2026 Revolving Facility contains a financial covenant that requires compliance with a springing first lien net leverage ratio test. If the outstanding balance under the 2026 Revolving Facility exceeds 30% of the $375.0 million borrowing capacity (excluding undrawn letters of credit up to $10.0 million and cash collateralized letters of credit) at a quarter end, then the Borrowers' first lien net leverage ratio may not exceed 3.50 to 1.00. As of December 31, 2022, the Group was in compliance with all debt covenant requirements under the Senior Credit Facility as of December 31, 2022.

As operating conditions in the beginning of 2023 were largely similar to 2022, the Group exceeded the first lien net leverage ratio as of March 31, 2023, which limits the availability of the 2026 Revolving Facility to 30% of the total capacity. The Group does not expect this limitation to adversely impact its operating expenditure needs.

Fees incurred in connection with the issuance of the 2028 Term Loan B were $18.7 million, which were capitalized and recorded within "Long-term debt, net of unamortized deferred financing fees" on the consolidated balance sheet, and are being amortized over the seven-year term of the 2028 Term Loan B using the effective interest method.

Fees incurred in connection with the 2026 Revolving Facility were $0.4 million, which were capitalized and recorded within "Deferred charges and other assets" on the consolidated balance sheet, and are being amortized along with the remaining $0.8 million of unamortized deferred financing fees from the 2022 Revolving Facility over the five-year term of the facility using the straight-line method.

2025 Senior Notes

On August 29, 2017, the Issuers executed an indenture (the "2017 Indenture") pursuant to which they issued $500.0 million aggregate principal amount of 5.375% senior notes due 2025 (the "2025 Senior Notes") in a 144A private transaction exempt from the registration requirements of the Securities Act of 1933, as amended. Interest on the 2025 Senior Notes is payable semi-annually on May 3 and November 3 of each year, commencing on May 3, 2018. The 2025 Senior Notes mature on September 1, 2025.

Fees and expenses incurred in connection with the issuance of the 2025 Senior Notes in 2017 were $9.7 million, which were capitalized and recorded within "Long-term debt, net of unamortized deferred financing fees" on the consolidated balance sheets, and are being amortized over the eight-year term of the 2025 Senior Notes using the effective interest method.

At any time prior to September 1, 2020, the Issuers were able to redeem the 2025 Senior Notes in whole or in part, at their option, at a redemption price equal to 100% of the principal amount of such notes plus the relevant applicable premium as of, and accrued and unpaid interest to, but not including, the redemption date. At any time and from time to time after September 1, 2020, the Issuers may redeem the 2025 Senior Notes, in whole or in part, at a redemption price equal to the percentage of principal amount set forth below plus accrued and unpaid interest, if any, on the notes redeemed to, but not including, the redemption date:

12-month period commencing September 1 in Year	Percentage
2020	102.688 %
2021	101.792 %
2022	100.896 %
2023 and thereafter	100.000 %

At any time prior to September 1, 2020, the Issuers were able to redeem up to 40% of the aggregate principal amount of the 2025 Senior Notes at a redemption price equal to 105.375%, plus accrued and unpaid interest to, but not including, the redemption date, with the aggregate gross proceeds from certain equity offerings.

The 2025 Senior Notes are the Issuers' senior unsecured obligations and rank equally in right of payment with all of the Issuers' existing and future indebtedness that is not expressly subordinated in right of payment thereto. The 2025 Senior Notes will be senior in right of payment to any future indebtedness that is expressly subordinated in right of payment thereto and effectively junior to (a) the Issuers' existing and future secured indebtedness, including the Group's Accounts Receivable Securitization Facility (defined below) and the Issuers' Senior Credit Facility, to the extent of the value of the collateral securing such indebtedness and (b) all existing and future liabilities of the Issuers' non-guarantor subsidiaries.

The 2017 Indenture contains customary covenants that, among other things, limit the Issuers' and certain of their subsidiaries' ability to incur additional indebtedness and guarantee indebtedness; pay dividends on, redeem or repurchase capital shares; make investments; prepay certain indebtedness; create liens; enter into transactions with the Issuers' affiliates; designate the Issuers' subsidiaries as Unrestricted Subsidiaries (as defined in the 2017 Indenture); and consolidate, merge, or transfer all or substantially all of the Issuers' assets. The covenants are subject to a number of exceptions and qualifications. Certain of these covenants will be suspended during any period of time that (1) the 2025 Senior Notes have investment grade ratings (as defined in the 2017 Indenture) and (2) no default has occurred and is continuing under the 2017 Indenture. In the event that the 2025 Senior Notes are downgraded to below an investment grade rating, the Issuers and certain subsidiaries will again be subject to the suspended covenants with respect to future events.

Accounts Receivable Securitization Facility

In 2010, Styron Receivable Funding Ltd. ("SRF"), a VIE in which the Group is the primary beneficiary, executed an agreement for an accounts receivable securitization facility (the "Accounts Receivable Securitization Facility"). As of December 31, 2022, the Accounts Receivable Securitization Facility permits borrowings by two of the Group's subsidiaries, Trinseo Europe GmbH ("TE") and Trinseo Export GmbH ("Trinseo Export"), up to a total of $150.0 million. As noted in the table above, in September 2021, the Group extended the maturity date of the facility to November 2021 and then further amended the facility in November 2021, which included extension of the maturity date to November 2024. As amended, the Accounts Receivable Securitization Facility incurs fixed interest charges of 1.65% on outstanding borrowings plus variable commercial paper rates, as well as fixed charges of 0.80% on available, but undrawn commitments. There were $0.4 million of fees incurred in connection with amending the facility which were capitalized and recorded within "Deferred charges and other assets" on the consolidated balance sheet and are being amortized over the five-year term of the facility using the straight-line method.

Under the Accounts Receivable Securitization Facility, TE and Trinseo Export sell their accounts receivable to SRF. In turn, SRF may utilize these receivables as collateral to borrow from commercial paper conduits in exchange for cash. The Group has agreed to continue servicing the receivables for SRF. If utilized as collateral by SRF, the conduits have a first priority perfected security interest in such receivables and, as a result, the receivables will not be available to the creditors of the Group or its other subsidiaries.

NOTE 13—DERIVATIVE INSTRUMENTS

The Group's ongoing business operations expose it to various risks, including fluctuating foreign exchange rates, interest rate risk and commodity price risk. To manage these risks, the Group periodically enters into derivative financial instruments, such as foreign exchange forward contracts, interest rate swap agreements, and commodity swap agreements, forward contracts, or options. The Group does not hold or enter into financial instruments for trading or speculative purposes. All derivatives are recorded in the consolidated balance sheets at fair value. Refer to Note 14 for fair value disclosures related to these instruments.

Foreign Exchange Forward Contracts

Certain subsidiaries have assets and liabilities denominated in currencies other than their respective functional currencies, which creates foreign exchange risk. The Group's principal strategy in managing its exposure to changes in foreign currency exchange rates is to naturally hedge the foreign currency-denominated liabilities on its balance sheet against corresponding assets of the same currency, such that any changes in liabilities due to fluctuations in exchange rates are offset by changes in their corresponding foreign currency assets. In order to further reduce this exposure, the Group also uses foreign exchange forward contracts to economically hedge the impact of the variability in exchange rates on assets and liabilities denominated in certain foreign currencies. The Group entered into a specific such foreign exchange forward contract for €950.0 million in December 2020 in order to economically hedge the euro-denominated purchase price of the PMMA business, which was acquired on May 3, 2021, as discussed in Note 4. These derivative contracts were not designated for hedge accounting treatment, and were settled during the year ended December 31, 2021.

As of December 31, 2022, the Group had open foreign exchange forward contracts with a notional U.S. dollar equivalent absolute value of $519.1 million. The following table displays the notional amounts of the most significant net foreign exchange hedge positions outstanding as of December 31, 2022:

Buy / (Sell)		**December 31, 2022**
Euro	$	(394.7)
Chinese Yuan	$	(49.7)
South Korean Won	$	(20.5)
Swiss Franc	$	(15.7)
New Taiwan Dollar	$	14.1

Open foreign exchange forward contracts as of December 31, 2022 have maturities occurring over a period of two months.

Foreign Exchange Cash Flow Hedges

The Group also enters into forward contracts with the objective of managing the currency risk associated with forecasted U.S. dollar-denominated raw materials purchases by one of its subsidiaries whose functional currency is the euro. By entering into these forward contracts, which are designated as cash flow hedges, the Group buys a designated amount of U.S. dollars and sells euros at the prevailing market rate to mitigate the risk associated with the fluctuations in the euro-to-U.S. dollar foreign currency exchange rate. The qualifying hedge contracts are marked-to-market at each reporting date and any unrealized gains or losses are included in AOCI to the extent effective, and reclassified to cost of sales in the period during which the transaction affects earnings or it becomes probable that the forecasted transaction will not occur.

The Group had no open foreign exchange cash flow hedges as of December 31, 2022.

Commodity Cash Flow Hedges & Commodity Economic Hedges

The Group purchases certain commodities, primarily natural gas, to operate facilities and generate heat and steam for various manufacturing processes, which purchases are subject to price volatility. In order to manage the risk of price fluctuations associated with these commodity purchases, as deemed appropriate, the Group may enter into commodity swaps, forward contracts, or options. As of December 31, 2022, the Group had open commodity swap agreements, which effectively convert a portion of its natural gas costs into a fixed rate obligation. Certain of these commodity derivatives are designated as cash flow hedges, and as such, the contracts are marked-to-market at each reporting date and any unrealized gains or losses are included in AOCI to the extent effective, and reclassified to cost of sales in the period during which the transaction affects earnings or it becomes probable that the forecasted transaction will not occur.

Open commodity cash flow hedges as of December 31, 2022 had maturities occurring over a period of 12 months and had a notional value of approximately 240 thousand megawatt hours of natural gas purchases.

The Group may also enter into certain commodity swap agreements to economically hedge the impact of these price fluctuations, which are not designated for hedge accounting treatment. Open commodity economic hedges as of December 31, 2022 had maturities occurring over a period of 27 months and had a notional value of approximately 879 thousand megawatt hours of natural gas purchases.

Interest Rate Swaps

On September 6, 2017, the Group issued the 2024 Term Loan B, which currently bears an interest rate of LIBOR plus 2.00%, subject to a 0.00% LIBOR floor. In order to reduce the variability in interest payments associated with the Group’s variable rate debt, during 2017 the Group entered into certain interest rate swap agreements to convert a portion of these variable rate borrowings into a fixed rate obligation. These interest rate swap agreements are designated as cash flow hedges, and as such, the contracts are marked-to-market at each reporting date and any unrealized gains or losses are included in AOCI to the extent effective, and reclassified to interest expense in the period during which the transaction affects earnings or it becomes probable that the forecasted transaction will not occur.
Under the terms of the swap agreements, with a net notional U.S. dollar equivalent of $200.0 million and an effective date of September 29, 2017, the Group was required to pay the counterparties a stream of fixed interest payments at a rate of 1.81%, and in turn, receives variable interest payments based on 1-month LIBOR from the counterparties. These interest rate swap agreements matured in September 2022, and the Group has no remaining open interest rate swap agreements as of December 31, 2022.

Net Investment Hedge

On September 1, 2017, the Group entered into certain fixed-for-fixed cross currency swaps (“CCS”), swapping USD principal and interest payments on its 2025 Senior Notes for euro-denominated payments. Under the terms of the CCS (the “2017 CCS”), the Group notionally exchanged $500.0 million at an interest rate of 5.375% for €420.0 million at a weighted average interest rate of 3.45% for approximately five years. Additionally, on September 1, 2017, the Group designated the full notional amount of the 2017 CCS (€420.0 million) as a hedge of its net investment in certain European subsidiaries under the forward method, with all changes in the fair value of the 2017 CCS recorded as a component of AOCI, as the 2017 CCS were deemed to be highly effective hedges. A cumulative foreign currency translation loss of $38.0 million was recorded within AOCI related to the 2017 CCS through March 31, 2018.

Effective April 1, 2018, in conjunction with the adoption of new hedge accounting guidance, the Group elected as an accounting policy to re-designate the 2017 CCS as a net investment hedge (and any future similar hedges) under the spot method. As such, changes in the fair value of the 2017 CCS included in the assessment of effectiveness (changes due to spot foreign exchange rates) were recorded as cumulative foreign currency translation within OCI, and will remain in AOCI until either the sale or substantially complete liquidation of the subsidiary. As of December 31, 2022, no gains or losses have been reclassified from AOCI into income related to the sale or substantially complete liquidation of the relevant subsidiaries. As an additional accounting policy election applied to similar hedges, the initial value of any component excluded from the assessment of effectiveness is recognized in income using a systematic and rational method over the life of the hedging instrument. Any difference between the change in the fair value of the excluded component and amounts recognized in income under that systematic and rational method is recognized in AOCI.

As of April 1, 2018, the initial excluded component value related to the 2017 CCS was $23.6 million, which the Group elected to amortize as a reduction of “Interest expense, net” in the consolidated statements of operations using the straight-line method over the remaining term of the 2017 CCS. Additionally, the Group recognizes the accrual of periodic USD and euro-denominated interest receipts and payments under the terms of its CCS arrangements, including its 2017 CCS, within “Interest expense, net” in the consolidated statements of operations.

On February 26, 2020, the Group settled its 2017 CCS and replaced it with a new CCS arrangement (the “2020 CCS”) that carried substantially the same terms as the 2017 CCS. Upon settlement of the 2017 CCS, the Group realized net cash proceeds of $51.6 million. The remaining $13.8 million unamortized balance of the initial excluded component related to the 2017 CCS at the time of settlement is no longer being amortized following the settlement and will remain in AOCI until either the sale or substantially complete liquidation of the relevant subsidiaries. Under the 2020 CCS, the Group notionally exchanged $500.0 million at an interest rate of 5.375% for €459.3 million at a weighted average interest rate of 3.672% for approximately 2.7 years, with a final maturity of November 3, 2022. The cash flows under the 2020 CCS are aligned with the Group’s principal and interest obligations on its 5.375% 2025 Senior Notes.

For the third quarter of 2020, based on the value of the Group’s net investment in certain of its European subsidiaries, a portion of the 2020 CCS was not a highly effective hedge. As a result, the Group de-designated €16.1 million of the 2020 CCS from being a net investment hedge for the third quarter of 2020, pursuant to which changes in the fair value of this non-hedged component were recognized within “Other expense (income), net” in the consolidated statements of operations during the third quarter of 2020. For the fourth quarter of 2020, the Group’s 2020 CCS returned to being a highly effective hedge and thus it was re-designated in its entirety as a net investment hedge.

On April 7, 2022, the Group settled its existing 2020 CCS, which were set to mature in November 2022. Upon settlement of the 2020 CCS, the Group realized net cash proceeds of $1.9 million.

Summary of Derivative Instruments

The following table presents the effect of the Group’s derivative instruments, including those not designated for hedge accounting treatment, on the consolidated statements of operations for the years ended December 31, 2022 and 2021:

	Location and Amount of Gain (Loss) Recognized in Statements of Operations		
	Year Ended December 31, 2022		
	Cost of sales	Interest expense, net	Other (expense) income, net
Total amount of income (expense) line items presented in the statements of operations, which include the effects of derivative instruments	$ (4,693.2)	$ (112.9)	$ 7.2
Effects of cash flow hedge instruments:			
Commodity cash flow hedges			
Amount of loss reclassified from AOCI into income	$ (6.1)	$ —	$ —
Interest rate swaps			
Amount of loss reclassified from AOCI into income	$ —	$ (1.2)	$ —
Effects of net investment hedge instruments:			
Cross currency swaps			
Amount of gain excluded from effectiveness testing	$ —	$ 2.4	$ —
Effects of derivatives not designated as hedge instruments:			
Foreign exchange forward contracts			
Amount of gain recognized in income	$ —	$ —	$ 49.0
Commodity economic hedges			
Amount of loss recognized in income	$ (6.6)	$ —	$ —

	Location and Amount of Gain (Loss) Recognized in Statements of Operations			
	Year Ended December 31, 2021			
	Cost of sales	Interest expense, net	Acquisition purchase	Other (expense) income, net

			price hedge gain (loss)	
Total amount of income (expense) line items presented in the statements of operations, which include the effects of derivative instruments	$ (4,128.6)	$ (79.4)	$ (22.0)	$ (9.5)
Effects of cash flow hedge instruments:				
Foreign exchange cash flow hedges				
Amount of gain reclassified from AOCI into income	$ 1.0	$ —	$ —	$ —
Interest rate swaps				
Amount of loss reclassified from AOCI into income	$ —	$ (3.5)	$ —	$ —
Effects of net investment hedge instruments:				
Cross currency swaps				
Amount of gain excluded from effectiveness testing	$ —	$ 7.4	$ —	$ —
Effects of derivatives not designated as hedge instruments:				
Foreign exchange forward contracts				
Amount of gain (loss) recognized in income	$ —	$ —	$ (22.0)	$ 63.2

The following table presents the effect of cash flow and net investment hedge accounting on AOCI for the years ended December 31, 2022 and 2021:

	Gain (Loss) Recognized in AOCI on Balance Sheets Year Ended December 31,	
	2022	2021
Designated as Cash Flow Hedges		
Foreign exchange cash flow hedges	$ —	$ 2.3
Commodity cash flow hedges	(15.1)	—
Interest rate swaps	2.2	3.6
Total	$ (12.9)	$ 5.9
Designated as Net Investment Hedges		
Cross currency swaps (CCS)	$ 15.8	$ 44.1
Total	$ 15.8	$ 44.1

	Gain (Loss) Recognized in Other expense (income), net in Statement of Operations Year Ended December 31,	
	2022	2021
Settlements and changes in the fair value of forward contracts (not designated as hedges) (1)	$ 49.0	$ 63.2
Remeasurement of foreign currency-denominated assets and liabilities	$ (41.0)	$ (61.9)
Total	$ 8.0	$ 1.3

(1) Amounts do not include the gain (loss) of $(22.0) million recorded from the change in fair value of the forward currency hedge arrangement on the euro-denominated purchase price of the PMMA business during the year ended December 31, 2021.

The Group expects to reclassify in the next twelve months an approximate $11.3 million net loss from AOCI into earnings related to the Group's outstanding commodity cash flow hedges as of December 31, 2022, based on current commodity price indices.

The following tables summarize the net unrealized gains and losses and balance sheet classification of outstanding derivatives recorded in the consolidated balance sheets:

	December 31, 2022			
Balance Sheet Classification	Foreign Exchange Forward Contracts	Commodity Economic Hedges	Commodity Cash Flow Hedges	Total
Asset Derivatives:				
Accounts receivable, net of allowance	$ 0.2	$ —	$ —	$ 0.2
Gross derivative asset position	0.2	—	—	0.2
Less: Counterparty netting	(0.1)	—	—	(0.1)
Net derivative asset position	$ 0.1	$ —	$ —	$ 0.1
Liability Derivatives:				
Accounts payable	$ (11.1)	$ (5.3)	$ (11.3)	$ (27.7)
Other noncurrent obligations	—	(1.3)	(0.9)	(2.2)
Gross derivative liability position	(11.1)	(6.6)	(12.2)	(29.9)
Less: Counterparty netting	0.1	—	—	0.1
Net derivative liability position	$ (11.0)	$ (6.6)	$ (12.2)	$ (29.8)
Total net derivative position	**$ (10.9)**	**$ (6.6)**	**$ (12.2)**	**$ (29.7)**

	December 31, 2021			
Balance Sheet Classification	Foreign Exchange Forward Contracts	Interest Rate Swaps	Cross Currency Swaps	Total
Asset Derivatives:				
Accounts receivable, net of allowance	$ 2.3	$ —	$ —	$ 2.3
Gross derivative asset position	2.3	—	—	2.3
Less: Counterparty netting	(0.1)	—	—	(0.1)
Net derivative asset position	$ 2.2	$ —	$ —	$ 2.2
Liability Derivatives:				
Accounts payable	$ (1.3)	$ (2.2)	$ (17.4)	$ (20.9)
Gross derivative liability position	(1.3)	(2.2)	(17.4)	(20.9)
Less: Counterparty netting	0.1	—	—	0.1
Net derivative liability position	$ (1.2)	$ (2.2)	$ (17.4)	$ (20.8)
Total net derivative position	**$ 1.0**	**$ (2.2)**	**$ (17.4)**	**$ (18.6)**

Forward contracts, commodity swaps, interest rate swaps, and cross currency swaps are entered into with a limited number of counterparties, each of which allows for net settlement of all contracts through a single payment in a single currency in the event of a default on or termination of any one contract. As such, in accordance with the Group's accounting policy, these derivative instruments are recorded on a net basis by counterparty within the consolidated balance sheets.

Refer to Notes 14 and 22 for further information regarding the fair value of the Group's derivative instruments and the related changes in AOCI.

NOTE 14—FAIR VALUE MEASUREMENTS

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Assets and liabilities measured at fair value are classified using the following hierarchy, which is based upon the transparency of inputs to the valuation as of the measurement date.

Level 1—Valuation is based upon quoted prices (unadjusted) for identical assets or liabilities in active markets.

Level 2—Valuation is based upon quoted prices for similar assets and liabilities in active markets, or other inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the financial instrument.

Level 3—Valuation is based upon other unobservable inputs that are significant to the fair value measurement.

The following tables summarize the basis used to measure certain assets and liabilities at fair value on a recurring basis in the consolidated balance sheets at December 31, 2022 and 2021:

	December 31, 2022			
Assets (Liabilities) at Fair Value	**Quoted Prices in Active Markets for Identical Items (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**	**Total**
Foreign exchange forward contracts—Assets	$ —	$ 0.1	$ —	$ 0.1
Foreign exchange forward contracts—(Liabilities)	—	(11.0)	—	(11.0)
Commodity economic hedges—(Liabilities)	—	(6.6)	—	(6.6)
Commodity cash flow hedges—(Liabilities)	—	(12.2)	—	(12.2)
Total fair value	$ —	$ (29.7)	$ —	$ (29.7)

	December 31, 2021			
Assets (Liabilities) at Fair Value	**Quoted Prices in Active Markets for Identical Items (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**	**Total**
Foreign exchange forward contracts—Assets	$ —	$ 2.2	$ —	$ 2.2
Foreign exchange forward contracts—(Liabilities)	—	(1.2)	—	(1.2)
Interest rate swaps—(Liabilities)	—	(2.2)	—	(2.2)
Cross currency swaps—(Liabilities)	—	(17.4)	—	(17.4)
Total fair value	$ —	$ (18.6)	$ —	$ (18.6)

The Group uses an income approach to value its derivative instruments, utilizing discounted cash flow techniques, considering the terms of the contract and observable market information available as of the reporting date, such as interest rate yield curves, currency spot and forward rates, and commodity spot and forward rates. Significant inputs to the valuation for these derivative instruments are obtained from broker quotations or from listed or over-the-counter market data, and are classified as Level 2 in the fair value hierarchy.

Nonrecurring Fair Value Measurements

In connection with the Group's strategy to focus efforts and increase investments in certain product offerings serving applications that are less cyclical and offer significantly higher growth and margin potential, and other management considerations, in March of 2020, the Group initiated a consultation process with the Economic Council and Works Councils of Trinseo Deutschland regarding the potential disposition of its styrene monomer assets in Boehlen, Germany. In late 2020, the Group completed its evaluation of the assets and decided to continue operating them, however the assessment of the long-lived asset group for impairment indicated that the carrying value was not recoverable when compared to the expected undiscounted future cash flows generated from the assets. The fair value of the depreciable assets was determined through an analysis of the underlying fixed asset records in conjunction with the use of industry experience and available market data. In the fourth quarter of 2022, the Group decided to close this plant in connection with the asset restructuring plan. Refer to Note 21 for further information.

As a result of the fair value measurements performed, the Group recorded impairment losses on the Boehlen styrene monomer assets of $6.3 million and $5.8 million for the years ended December 31, 2022 and 2021, respectively. These impairment losses reflect the initial impairment loss taken in March of 2020, as well as subsequent impairment losses related to ongoing capital expenditures at the Boehlen styrene monomer facility that were determined to be impaired. These losses are recorded within “Impairment and other charges” on the consolidated statements of operations and are allocated to the Feedstocks segment. As of December 31, 2022 and 2021, the value of the Boehlen styrene monomer assets recorded within the Group’s consolidated balance sheets was $3.2 million and $3.4 million, respectively.

During the year ended December 31, 2022, the Group recorded a $297.1 million goodwill impairment loss related to the PMMA business and Aristech Surfaces reporting units. Refer to Note 10 for further information. There were no other financial assets and no financial liabilities measured at fair value on a nonrecurring basis as of December 31, 2022 and 2021.

Fair Value of Debt Instruments

The following table presents the estimated fair value of the Group’s outstanding debt not carried at fair value as of December 31, 2022 and 2021:

	As of December 31, 2022	As of December 31, 2021
2029 Senior Notes	$ 292.3	$ 460.2
2028 Term Loan B	687.1	737.4
2025 Senior Notes	416.9	509.4
2024 Term Loan B	645.6	667.5
Total fair value	$ 2,041.9	$ 2,374.5

The fair value of the Group’s debt facilities above (each Level 2 securities) is determined using over-the-counter market quotes and benchmark yields received from independent vendors. Fair value amount presented reflect the Group’s carrying value of debt, net of original issuance discount.

There were no other significant financial instruments outstanding as of December 31, 2022 and 2021.

NOTE 15—INCOME TAXES

Income (loss) from continuing operations before income taxes earned within and outside the United States is shown below:

	Year Ended December 31, 2022	Year Ended December 31, 2021
United States	$ (162.1)	$ 73.5
Outside of the United States	(271.5)	258.8
Income before income taxes	$ (433.6)	$ 332.3

The provision for income taxes is composed of:

	Year Ended December 31, 2022			Year Ended December 31, 2021		
	Current	Deferred	Total	Current	Deferred	Total
U.S. federal	$ 20.9	$ (56.3)	$ (35.4)	$ 5.9	$ 4.4	$ 10.3
U.S. state and other	4.3	(10.3)	(6.0)	1.7	0.8	2.5
Non-U.S.	26.5	(26.7)	(0.2)	65.4	(7.3)	58.1
Total	$ 51.7	$ (93.3)	$ (41.6)	$ 73.0	$ (2.1)	$ 70.9

The effective tax rate on pre-tax income differs from the U.S. statutory rate due to the following:

	Year Ended December 31,	
	2022	2021
Taxes at U.S. statutory rate(1)	$ (98.6)	$ 73.6
State and local income taxes	(6.8)	2.2
Non U.S. statutory rates, including credits	13.0	(9.2)
Unremitted earnings	(5.9)	6.3
Change in valuation allowances(2)(3)	(5.8)	(17.7)
Uncertain tax positions	(0.9)	(1.0)
Withholding taxes	5.5	6.9
Share-based compensation	0.7	0.1
Non-deductible interest	1.2	1.0
Non-deductible other expenses	11.2	2.7
Provision to return adjustments	(1.6)	3.1
U.S. Base Erosion and Anti-Abuse Tax	—	—
Swiss deferred tax asset revaluation(3)	19.7	—
Goodwill impairment(4)	19.7	—
European Commission request for information(5)	7.6	—
Other—net	(0.6)	2.9
Total provision for income taxes	$ (41.6)	$ 70.9
Effective tax rate	10 %	21 %

(1) The U.S. statutory rate of 10% and 21% as of December 31, 2022 and 2021, respectively, has been used as management believes it is more meaningful to the Group.

(2) The year ended December 31, 2021 includes a $16.3 million one-time deferred tax benefit recorded due to the release of a valuation allowance, as a result of improvements in business operations and projected future results of the Group's subsidiaries in China.

(3) The year ended December 31, 2022 includes an impact of $19.7 million for the revaluation of the Group's deferred tax assets in Switzerland. Additionally, a corresponding valuation allowance of $4.4 million was released.

(4) The year ended December 31, 2022 includes an impact of $19.7 million for the portion of the goodwill impairment which the Group cannot take a benefit for tax purposes.

(5) The year ended December 31, 2022 includes an impact of $7.6 million related to the settlement payment for the European Commission request for information, for which the Group estimates no tax benefit.

Provision for income taxes decreased by $112.5 million from 2021 to 2022 primarily due to the $765.9 million decrease in income from continuing operations before income taxes, in addition to a release of a valuation allowance of $8.5 million in 2022, as a result of improvements in business operations and projected future results of the Group's Luxembourg subsidiary. Offsetting this decrease was the revaluation of the Group's net deferred tax assets in Switzerland which resulted in a one-time deferred tax expense of $15.3 million.

Deferred income taxes reflect temporary differences between the valuation of assets and liabilities for financial and tax reporting:

	December 31,			
	2022		2021	
	Deferred Tax Assets	Deferred Tax Liabilities	Deferred Tax Assets	Deferred Tax Liabilities
Tax loss and credit carryforwards[1]	$ 121.6	$ —	$ 98.5	$ —
Unremitted earnings	—	29.8	—	35.7
Unconsolidated affiliates	—	15.1	—	15.3
Other accruals and reserves	32.5	—	29.8	—
Property, plant and equipment	—	81.2	—	97.2
Goodwill and other intangible assets[2]	88.7	—	70.7	—
Accrued interest	19.2	—	6.9	—
Employee benefits	20.0	—	44.4	—
	282.0	126.1	250.3	148.2
Valuation Allowance[1][3]	(118.4)	—	(127.7)	—
Total	$ 163.6	$ 126.1	$ 122.6	$ 148.2

(1) For the year ended December 31, 2021, $63.3 million of net operating losses were written off related to Trinseo S.A., our former parent company, that was merged into Trinseo PLC (refer to Note 1), offset by the write off of a $63.3 million associated valuation allowance.

(2) Includes the impact of Swiss federal and cantonal tax reform of $2.8 million and $41.1 million, respectively, as of December 31, 2022 and $3.4 million and $62.1 million, respectively, as of December 31, 2021, measured at period-end exchange rates. See discussion below for further information.

(3) Includes a valuation allowance of $20.1 million and $25.8 million as of December 31, 2022 and 2021, respectively, related to Swiss cantonal tax reform, measured at period-end exchange rates. See discussion below for further information.

As of December 31, 2022 and 2021, all undistributed earnings of foreign subsidiaries and affiliates are expected to be repatriated.

Operating loss carryforwards amounted to $582.1 million in 2022 and $389.4 million in 2021. As of December 31, 2022, $21.6 million of the operating loss carryforwards were subject to expiration in 2023 through 2027, and $560.4 million of the operating loss carryforwards expire in years beyond 2027 or have an indefinite carryforward period. The Group had valuation allowances which were related to the realization of recorded tax benefits on tax loss carryforwards, as well as other net deferred tax assets, primarily from subsidiaries in Luxembourg and Switzerland of $118.4 million as of December 31, 2022 and $127.7 million as of December 31, 2021.

Swiss federal and cantonal tax reform was enacted on August 6, 2019 and October 25, 2019, respectively, and includes measures such as, the elimination of certain preferential tax regimes and implementation of new tax rates at both the federal and cantonal levels. It also includes transitional relief measures which may provide for future tax deductions. The Group believes it is more likely than not that a portion of this deferred tax benefit recorded as a result of these cantonal tax law changes, will not be realized during the utilization period provided by the legislation, spanning 2023 through 2029. This is based on the Group's estimate of future taxable income in Switzerland, which was determined using management's judgment and assumptions about various factors, such as: historical experience and results, cyclicality of the business, implications of COVID-19, recent acquisitions and divestitures, and future industry and macroeconomic conditions and trends possible during the aforementioned utilization period. As a result, the Group recorded a $25.3 million valuation allowance as of December 31, 2019. During the second quarter of 2022, Trinseo revalued its deferred tax assets in Switzerland, as well as adjusted the related valuation allowance. Trinseo reduced the deferred tax asset by $19.7 million and released a corresponding valuation allowance of $4.4 million. As of December 31, 2022, due to foreign exchange translation, the total valuation allowance recorded is $20.1 million.

It is possible that the remainder of the one-time deferred tax benefit from Swiss tax law changes may expire unused if the Group is not able to generate sufficient taxable income in Switzerland. In the future, if the Group cannot assert it is more likely than not it will realize this net deferred tax asset, an additional valuation allowance will be established, impacting the Group's financial position and results of operations in the period recognized.

For the years presented, a reconciliation of the beginning and ending amount of the unrecognized tax benefits is as follows:

Balance as of December 31, 2020	$	8.5
Increases related to current year tax positions		0.6
Increases related to prior year tax positions		—
Decreases related to prior year tax positions		(0.2)
Settlement of uncertain tax positions		(1.4)
Decreases due to expiration of statues of limitations		—
Balance as of December 31, 2021	$	7.5
Increases related to current year tax positions		0.7
Increases related to prior year tax positions		0.1
Decreases related to prior year tax positions		(0.4)
Settlement of uncertain tax positions		(0.3)
Decrease due to expiration of statutes of limitations		(1.1)
Balance as of December 31, 2022	$	6.5

In regard to unrecognized tax benefits, the Group recognized expense related to interest and penalties of $0.4 million and $0.3 million during the years ended December 31, 2022 and 2021, respectively. Interest and penalties related to unrecognized tax benefits were included as a component of income tax expense in the consolidated statements of operations. As of December 31, 2022 and 2021, the Group had $1.4 million and $1.8 million, respectively, accrued for interest and penalties. To the extent that the unrecognized tax benefits are recognized in the future, $7.2 million will impact the Group's effective tax rate.

As of December 31, 2022, there are no unrecognized tax benefits that the Group anticipates could be realized within the next 12 months due to the expiration of the statute of limitations in certain jurisdictions, including the impact relating to accrued interest and penalties.

Tax years that remain subject to examination for the Group's major tax jurisdictions are shown below.

Major Tax Jurisdictions	Earliest Open Year
United States: Federal income tax	2019
Germany	2014
Switzerland	2017
Netherlands	2017
Luxembourg	2012
China	2012
Hong Kong	2006
Indonesia	2017
Italy	2010

NOTE 16—COMMITMENTS AND CONTINGENCIES

Environmental Matters

Accruals for environmental matters are recorded when it is probable that a liability has been incurred and the amount of the liability can be reasonably estimated, based on current law, existing technologies and other information. Pursuant to the terms of the Dow Separation, the pre-closing environmental conditions were retained by Dow and the Group has been indemnified by Dow from and against all environmental liabilities incurred or relating to the predecessor periods. There are several properties which the Group now owns on which Dow has been conducting investigation, monitoring, or remediation to address historical contamination. Those properties include Dalton, Georgia. There are other properties with historical contamination that are owned by Dow that the Group leases for its operations, including its facilities in Midland, Michigan, Schkopau, Germany, and Terneuzen, The Netherlands. Other than certain immaterial environmental liabilities assumed as part of the PMMA Acquisition and the Aristech Surfaces Acquisition, no material environmental claims have been asserted against the Group, and the Group does not have any material accrued obligations for any Superfund sites. As of December 31, 2022 and 2021, the Group had $3.5 million (adjusted for foreign currency rates) and $4.4 million, respectively, of accrued obligations for environmental remediation or restoration costs, which were recorded at fair value within the opening balance sheets of the PMMA business and Aristech Surfaces during 2021.

On March 24, 2023, due to equipment failure at the Bristol, Pennsylvania facility, operated by our wholly-owned subsidiary, Altuglas LLC, an accidental release of a latex emulsion product occurred, which ultimately flowed into a local waterway (the "Bristol Spill"). We reported the event and cooperated closely with local, state, and federal authorities on the response activities. Water sampling conducted by the authorities did not detect site-related material in the waterway. See "Litigation Matters" below for information on environmental proceedings related to this incident. In the event of one or more adverse determinations related to this matter, it is possible that the ultimate liability resulting from this matter and the impact on the Group's results of operations could be material.

Inherent uncertainties exist in the Group's potential environmental liabilities primarily due to unknown conditions, whether future claims may fall outside the scope of the indemnity, changing governmental regulations and legal standards regarding liability, and evolving technologies for handling site remediation and restoration. In connection with the Group's existing indemnification, the possibility is considered remote that environmental remediation costs will have a material adverse impact on the consolidated financial statements over the next 12 months.

Purchase Commitments

In the normal course of business, the Group has certain raw material purchase contracts under which it is required to purchase certain minimum volumes at current market prices. These commitments have remaining terms ranging from one to four years. The following table presents the fixed and determinable portion (based on current pricing indexes) of the minimum obligation under the Group's purchase commitments with remaining contract terms in excess of one year as of December 31, 2022:

Annual Commitment						
2023	**2024**	**2025**	**2025**	**2027**	**Thereafter**	**Total**
$ 478.6	$ 492.8	$ 274.8	$ 61.4	$ 41.9	$ —	$ 1,349.5

In certain raw material purchase contracts, the Group has the right to purchase less than the required minimums and pay a liquidated damages fee, or, in case of a permanent plant shutdown, to terminate the contracts. In such cases, these obligations would be less than the obligations shown in the table above.

During the year ended December 31, 2022, the Group recorded a one-time charge within "Cost of sales" in the consolidated statement of operations of approximately $18.1 million related to estimated raw material purchase contract obligations.

Asset Retirement Obligations

The Group has built certain manufacturing facilities on leased land and is required to remove these facilities at the end of the corresponding contract term. Legal obligations for these demolition and decommissioning activities exist in connection with the retirement of these assets triggered upon closure of the facilities. In instances when the Group plans to continue operations at these facilities indefinitely, and therefore, a reasonable estimate of fair value cannot be determined, an asset retirement obligation is not recognized.

In connection with the asset restructuring plan as described within Note 21, the Group concluded the Boehlen, Germany site no longer had an indeterminate life. Accordingly, during the year ended December 31, 2022, the Group recorded the fair value of an asset retirement obligation and a corresponding asset retirement cost, which was capitalized as part of the carrying amount of the related long-lived assets and depreciated over the asset's shortened useful life. The asset retirement cost was fully depreciated during the year ended December 31, 2022.

Change in asset retirement obligation	Balance at December 31, 2022
Balance at beginning of period	$ —
Obligations incurred	35.1
Settlements	(0.5)
Accretion expense	0.2
Currency translation adjustment	1.0
Balance at end of period	$ 35.8

Accretion expense is included within "Selling, general and administrative expenses" in the consolidated statement of operations. The current portion of the asset retirement obligation is recorded within "Current provisions" and the long-term portion is recorded within "Noncurrent provisions" in the consolidated balance sheets. As of December 31, 2022, the current portion was $25.3 million, and the long-term portion was $10.5 million. There were no balances recorded as of December 31, 2021.

Litigation Matters

From time to time, the Group may be subject to various legal claims and proceedings incidental to the normal conduct of business, relating to such matters as product liability, antitrust/competition, past waste disposal practices and release of chemicals into the environment. While it is impossible at this time to determine with certainty the ultimate outcome of these routine claims, the Group does not believe that the ultimate resolution of these claims will have a material adverse effect on the Group's results of operations, financial condition or cash flow. Legal costs, including those legal costs expected to be incurred in connection with a loss contingency, are expensed as incurred.

Synthos Matter

On November 21, 2022, the Group received formal notice from the German Arbitration Institute that Synthos had initiated an arbitration dispute on October 14, 2022 against Trinseo and its following subsidiaries: Trinseo Deutschland GmbH, Trinseo Belgium BV, Trinseo Europe GmbH, and Trinseo Export GmbH, related to Synthos' purchase of Trinseo's Rubber Business in 2021.

As discussed in Note 5, Synthos and Trinseo are parties to an asset purchase agreement ("APA") dated May 21, 2021, whereby Trinseo transferred its Rubber Business to Synthos, pending regulatory approval and other administrative pre-closing conditions, for an enterprise value of approximately $491.0 million. This transaction formally closed on December 1, 2021. Synthos claims that Trinseo did not properly disclose certain information including the natural gas pricing mechanism for the steam which is supplied by a third party to the Rubber Business. Synthos is seeking non-monetary restitution and monetary damages related to the spike of utility prices in Germany that commenced in the fall of 2021.

The Group believes it has valid and prevailing defenses to Synthos' claims and intends to vigorously defend itself against all allegations.

European Commission Request for Information

On June 6, 2018, Trinseo Europe GmbH, a subsidiary of the Group, received a Request for Information in the form of a letter from the European Commission Directorate General for Competition (the "European Commission") related to styrene monomer commercial activity in the European Economic Area. The Group subsequently commenced an internal investigation into these commercial activities and discovered instances of inappropriate activity.

As a result of further developments in this matter, the Group recorded a charge of $36.2 million, which was included within "Impairment and other charges" on the consolidated statement of operations during the year ended December 31, 2021. In November 2022, the Group reached a final settlement with the European Commission in respect of this matter of $33.8 million, adjusted for foreign exchange rate impacts, which was subsequently paid in full in December 2022.

<u>*Legal Proceedings related to the Bristol Spill*</u>

(a) *Jonnie Helfrich v. Trinseo PLC (No. 2:23-cv-01525) (United States District Court for the Eastern District of Pennsylvania)*

On April 20, 2023, a complaint was filed which purports to be on behalf of a class of purchasers of the Company's securities between May 3, 2021 and March 27, 2023. It names as defendants the Group and our chief executive officer and chief financial officer, and seeks unspecified damages and other relief for alleged violations of Sections 10(b) and 20(a) of, and Rule 10b-5 under, of the Securities Exchange Act of 1934. Given the early stage of this matter, we are not able to estimate whether a material loss to our business is probable or remote, or estimate a potential range of loss, if any. The Group intends to vigorously defend this action.

(b) *Timothy McGraw, Emily Cohen & Danielle Byrd v. Altuglas LLC and Trinseo LLC (Court of Common Pleas of Philadelphia County)*

On March 29, 2023, a putative class action complaint was filed which seeks to certify a class that could potentially include all persons and entities that reside in the area served by the Baxter Drinking Water Treatment Plant. The plaintiffs allege claims of breach of duty of care based on negligence as a result of the Bristol Spill, as well as other causes of action, and seek compensatory damages, restitution, or refund of damages, including actual, statutory, and punitive damages, as well as injunctive relief. Given the early stage of this matter, we are not able to estimate whether a material loss to our business is probable or remote, or estimate a potential range of loss, if any. The Group intends to vigorously defend this action.

(c) *Environmental Proceedings*

On March 25, 2023, the Group received a Notice of Federal Interest from the United States Coast Guard ("USCG"), identifying the Company as a "potentially responsible party" ("PRP") related to the Bristol Spill. The Group also received a Notice of Federal Assumption and an Administrative Order, dated April 20, 2023 from the USCG, identifying the Company as a PRP related to the Bristol Spill. The USCG notices and order do not designate specific fines or penalties against the Company. It is not possible at this time for the Group to estimate its ultimate liability pursuant to the USCG notices or order, or other potential administrative actions related to the Bristol Spill, whether a material loss to our business is probable or remote, or estimate a potential range of loss, if any.

NOTE 17—PENSION PLANS AND OTHER POSTRETIREMENT BENEFITS

Defined Benefit Pension Plans

Many of the Group's employees are participants in various defined benefit pension plans which are administered and sponsored by the Group and are primarily in Germany, Switzerland, The Netherlands, The United States, China, Belgium, France, Taiwan, Indonesia, Italy, Mexico, and Japan.

Company employees who were not previously associated with the acquired pension and postretirement plans are not eligible for enrollment in a number of these plans. Pension benefits are typically based on length of service and the employee's final average compensation

Other Postretirement Benefits

The Group provides certain health care and life insurance benefits primarily to Dow-heritage employees in the United States when they retire.

In the U.S., the plan provides for health care benefits, including hospital, physicians' services, drug and major medical expense coverage. In general, the plan applies to employees hired by Dow before January 1, 2008 and transferred to the Group in connection with the Dow Separation, and who are at least 50 years old with 10 years of service. The plan allows for spouse coverage as well. If an employee was hired on or before January 1, 1993, the coverage extends past age 65. For employees hired after January 1, 1993 but before January 1, 2008, coverage ends at age 65. The Group reserves the right to modify the provisions of the plan at any time, including the right to terminate, and does not guarantee the continuation of the plan or its provisions.

Assumptions

The weighted average assumptions used to determine pension plan obligations and net periodic benefit costs are provided below:

	Non-U.S. Defined Benefit Pension Plans		U.S. Defined Benefit Pension Plans	
	Pension Plan Obligations December 31,			
	2022	2021	2022	2021
Discount rate for projected benefit obligation	3.51 %	1.10 %	5.53 %	2.92 %
Rate of increase in future compensation levels	3.01 %	2.90 %	3.00 %	3.00 %

	Non-U.S. Defined Benefit Pension Plans		U.S. Defined Benefit Pension Plans [1]	
	Net Periodic Benefit Costs December 31,			
	2022	2021	2022	2021
Discount rate for projected benefit obligation	1.10 %	0.74 %	2.92 %	3.09 %
Discount rate for service cost	1.20 %	0.78 %	3.00 %	3.20 %
Discount rate for interest cost	0.93 %	0.57 %	2.44 %	2.37 %
Rate of increase in future compensation levels	2.90 %	2.84 %	3.00 %	3.00 %
Expected long-term rate of return on plan assets	0.84 %	0.66 %	5.40 %	5.89 %

The weighted average assumptions used to determine other postretirement benefit ("OPEB") obligations and net periodic benefit costs are provided below:

	OPEB Obligations December 31,		Net Periodic Benefit Costs December 31,	
	2022	2021	2022	2021
Discount rate for accumulated postretirement benefit obligation	6.01 %	2.90 %	2.90 %	3.11 %
Discount rate for service cost	N/A	N/A	2.99 %	3.32 %
Discount rate for interest cost	N/A	N/A	2.42 %	2.34 %
Initial health care cost trend rate	6.25 %	6.00 %	6.00 %	6.25 %
Ultimate health care cost trend rate	5.00 %	5.00 %	5.00 %	5.00 %
Year ultimate trend rate to be reached	2028	2026	2026	2026

The Group determines the discount rate used to measure plan liabilities as of the December 31 measurement date for the pension and postretirement benefit plans. The discount rate reflects the current rate at which the associated liabilities could be effectively settled at the end of the year. The Group sets its rate to reflect the yield of a portfolio of high quality, fixed-income debt instruments that would produce cash flows sufficient in timing and amount to settle projected future benefits. The Group uses a full yield curve approach in the estimation of the future service and interest cost components of net periodic benefit cost for its defined benefit pension and other postretirement benefit plans by applying the specific spot rates along the yield curve used in the determination of the benefit obligation to the relevant projected cash flows.

The expected long-term rate of return on plan assets is determined by performing an analysis of key economic and market factors impacting historical returns for each asset class and formulating a projected return based on factors in the current environment. Factors considered include, but are not limited to, inflation, real economic growth, interest rate yield, interest rate spreads, and other valuation measures and market metrics. The expected long-term rate of return for each asset class is then weighted based on the strategic asset allocation approved by the governing body for each plan. The historical experience with the pension fund asset performance is also considered.

The net periodic benefit costs for the pension and other postretirement benefit plans for the years ended December 31, 2022 and 2021 were as follows:

	Non-U.S. Defined Benefit Pension Plans December 31,		U.S. Defined Benefit Pension Plans December 31,		Other Postretirement Benefit Plans December 31,	
	2022	2021	2022	2021	2022	2021
Net periodic benefit cost[1]						
Service cost	$ 12.2	$ 16.0	$ 0.9	$ 0.5	$ 0.1	$ 0.1
Interest cost	3.4	2.5	0.8	0.5	0.2	0.1
Expected return on plan assets	(1.1)	(1.0)	(0.9)	(0.7)	—	—
Amortization of prior service credit	(0.4)	(0.9)	—	—	(0.1)	—
Amortization of net (gain) loss	2.5	6.3	—	—	(0.1)	(0.1)
Settlement and curtailment (gain) loss	(3.5)	(1.6)	(0.5)	0.1	—	—
Net periodic benefit cost	$ 13.1	$ 21.3	$ 0.3	$ 0.4	$ 0.1	$ 0.1
Amounts recognized in other comprehensive income (loss)						
Net (gain) loss	$ (82.7)	$ (35.5)	$ (2.0)	$ 0.7	$ (3.7)	$ (0.2)
Amortization of prior service credit	0.4	0.9	—	—	0.1	—
Amortization of net gain (loss)	(2.5)	(6.3)	—	—	0.1	0.1
Settlement and curtailment gain (loss)	3.5	1.6	0.5	(0.1)	—	—
Prior service credit	(0.2)	(2.4)	—	—	—	—
Total recognized in other comprehensive income (loss)	(81.5)	(41.7)	(1.5)	0.6	(3.5)	(0.1)
Net periodic benefit cost	13.1	21.3	0.3	0.4	0.1	0.1
Total recognized in net periodic benefit cost and other comprehensive income (loss)	$ (68.4)	$ (20.4)	$ (1.2)	$ 1.0	$ (3.4)	$ —

(1) Service cost related to the Group’s defined benefit pension plans and other postretirement plans is included within “Cost of sales” and “Selling, general and administrative expenses,” whereas all other components of net periodic benefit cost are included within “Other expense (income), net” in the consolidated statements of operations.

The changes in the pension benefit obligations, the fair value of plan assets, and the funded status of all significant plans for the years ended December 31, 2022 and 2021 were as follows:

	Non-U.S. Defined Benefit Pension Plans		U.S. Defined Benefit Pension Plans		Other Postretirement Benefit Plans	
	December 31,		December 31,		December 31,	
	2022	2021	2022	2021	2022	2021
Change in projected benefit obligations						
Benefit obligation at beginning of period	$ 393.8	$ 446.5	$ 30.5	$ —	$ 7.5	$ 6.7
Service cost	12.2	16.0	0.9	0.5	0.1	0.1
Interest cost	3.4	2.5	0.8	0.5	0.2	0.1
Plan participants' contributions	1.5	1.7	—	—	—	—
Actuarial changes in assumptions and experience (1)	(113.8)	(28.1)	(6.5)	1.2	(3.7)	(0.2)
Benefits paid from fund	(0.9)	(1.1)	—	—	—	—
Benefit payments by employer	(4.2)	(2.9)	(1.7)	(0.2)	(0.1)	—
Acquisitions (2)	—	6.7	—	31.5	—	0.8
Plan amendments	(0.1)	(2.4)	—	—	—	—
Curtailments	(0.9)	(3.3)	—	—	—	—
Settlements	(11.1)	(10.1)	(8.1)	(3.0)	—	—
Currency impact	(22.5)	(31.7)	—	—	—	—
Benefit obligation at end of period	$ 257.4	$ 393.8	$ 15.9	$ 30.5	$ 4.0	$ 7.5
Change in plan assets						
Fair value of plan assets at beginning of period	$ 139.1	$ 157.1	$ 18.0	$ —	$ —	$ —
Actual return on plan assets	(30.9)	(1.1)	(3.6)	1.3	—	—
Settlements	(11.1)	(10.1)	(8.1)	(3.0)	—	—
Employer contributions	6.3	5.7	2.4	1.1	0.1	—
Plan participants' contributions	1.5	1.7	—	—	—	—
Benefits paid	(5.0)	(4.0)	(1.7)	(0.2)	(0.1)	—
Acquisitions (2)	—	0.7	—	18.8	—	—
Currency impact	(7.4)	(10.9)	—	—	—	—
Fair value of plan assets at end of period	92.5	139.1	7.0	18.0	—	—
Funded status at end of period	$ (164.9)	$ (254.7)	$ (8.9)	$ (12.5)	$ (4.0)	$ (7.5)

(1) The actuarial gain incurred during the years ended December 31, 2022 and 2021 was primarily due to the increase in discount rates during the years.
(2) Amount as of December 31, 2021 relates primarily to the pension liabilities assumed in conjunction with the PMMA Acquisition.

The net amounts recognized in the consolidated balance sheets as of December 31, 2022 and 2021 were as follows:

	Non-U.S. Defined Benefit Pension Plans		U.S. Defined Benefit Pension Plans		Other Postretirement Benefit Plans	
	December 31,		December 31,		December 31,	
	2022	2021	2022	2021	2022	2021
Net amounts recognized in the balance sheets as of December 31						
Current liabilities	$ (4.9)	$ (4.5)	$ —	$ —	$ (0.1)	$ (0.2)
Noncurrent liabilities	(160.0)	(250.2)	(8.9)	(12.5)	(3.9)	(7.3)
Net amounts recognized in the balance sheet	$ (164.9)	$ (254.7)	$ (8.9)	$ (12.5)	$ (4.0)	$ (7.5)
Accumulated benefit obligation at the end of the period	$ 242.8	$ 367.7	$ 14.0	$ 27.4	$ 4.0	$ 7.5
Pretax amounts recognized in AOCI as of December 31						
Net prior service credit	$ (1.6)	$ (2.4)	$ —	$ —	$ —	$ —
Net loss (gain)	(30.6)	51.6	(0.9)	0.6	(5.1)	(1.6)
Total at end of period	$ (32.2)	$ 49.2	$ (0.9)	$ 0.6	$ (5.1)	$ (1.6)

The estimated future benefit payments, reflecting expected future service, as appropriate, are presented in the following table:

	2023	2024	2025	2026	2027	2028 through 2032	Total
Non-U.S. defined benefit pension plans	$ 8.9	$ 7.9	$ 9.6	$ 10.7	$ 11.5	$ 70.1	$ 118.7
U.S. defined benefit pension plans	1.0	0.8	0.9	1.0	1.1	6.3	11.1
Other postretirement benefit plans	0.1	0.2	0.3	0.3	0.3	1.9	3.1
Total	$ 10.0	$ 8.9	$ 10.8	$ 12.0	$ 12.9	$ 78.3	$ 132.9

The Group estimates it will make cash contributions, including benefit payments for unfunded plans, of $13.1 million in 2023 to the defined benefit pension plans.

The following information relates to pension plans with projected and accumulated benefit obligations in excess of the fair value of plan assets as of December 31, 2022 and 2021:

	Non-U.S. Defined Benefit Pension Plans		U.S. Defined Benefit Pension Plans	
	December 31,		December 31,	
Projected Benefit Obligation Exceeds the Fair Value of Plan Assets	2022	2021	2022	2021
Projected benefit obligations	$ 195.9	$ 294.2	$ 15.9	$ 30.5
Fair value of plan assets	$ 31.1	$ 39.6	$ 7.0	$ 18.0

	Non-U.S. Defined Benefit Pension Plans		U.S. Defined Benefit Pension Plans	
	December 31,		December 31,	
Accumulated Benefit Obligation Exceeds the Fair Value of Plan Assets	2022	2021	2022	2021
Accumulated benefit obligations	$ 177.0	$ 268.1	$ 14.0	$ 27.9
Fair value of plan assets	$ 26.4	$ 39.6	$ 7.0	$ 18.0

Plan Assets

Plan assets totaled $99.5 million as of December 31, 2022 and $157.1 million as of December 31, 2021, consisting primarily of investments in insurance contracts, as well as equity and debt securities.

The Group's investment strategy with respect to pension assets outside of the United States is to pursue an investment plan consisting of investments in insurance contracts that provide for guaranteed returns. For pension assets inside of the United States, the Group's investment strategy is to pursue an investment plan that, over the long term, will satisfy the funding objectives of the plan, and generate a total return that provides sufficient assets to fund plan liabilities, subject to a prudent level of risk, while maintaining compliance with various laws and regulations. The Group has established target allocations for each asset category, which is reviewed periodically to assess the need to rebalance the plan.

Plan assets outside the United States are invested in a mix of asset classes designed to generate strong long-term growth of principal while avoiding excessive risk. Assets may include, but are not necessarily limited to, equities, fixed income, liquid marketable assets, and less liquid alternatives. Additionally, the portfolio may include assets with the objective of hedging interest rate risk inherent in pension plan liabilities through the use of fixed income assets with various duration exposure. This portfolio diversification is expected to reduce the impact of losses in single investments, and mitigate the risk of volatility, while providing sufficient assets and liquidity to pay benefits and expenses as they come due.

Pension plan assets are managed by outside investment managers. The investment managers value our plan assets using quoted market prices, other observable inputs or unobservable inputs. Certain assets are not available on an exchange or in an active market and these investments are valued using their net asset value, which is generally based on the underlying asset values of the investments held in the funds. Investments in the pension plan insurance were valued utilizing unobservable inputs, which are contractually determined based returns, fees, and the present value of the future cash flows, or cash surrender values, of the contracts.

The following plan assets are measured at fair value on a recurring basis:

	December 31, 2022			
Basis of Fair Value Measurements	**Total**	**Quoted Prices in Active Markets for Identical Items (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
U.S. defined benefit pension plans:				
Cash	$ —	$ —	$ —	$ —
Investments measured at net asset value[1]:				
Equities	4.3	—	—	—
Debt	2.7	—	—	—
Total U.S. defined benefit pension plan assets	$ 7.0	$ —	$ —	$ —
Non-US defined benefit pension plans:				
Insurance contracts	$ 92.5	$ —	$ —	$ 92.5
Total non-U.S. defined benefit pension plan assets	$ 92.5	$ —	$ —	$ 92.5

Basis of Fair Value Measurements	Total	December 31, 2021 Quoted Prices in Active Markets for Identical Items (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
U.S. defined benefit pension plans:				
Cash	$ 0.5	$ 0.5	$ —	$ —
Investments measured at net asset value(1):				
Equities	10.6	—	—	—
Debt	6.9	—	—	—
Total U.S. defined benefit pension plan assets	$ 18.0	$ 0.5	$ —	$ —
Non-US pension plans:				
Insurance Contracts	$ 139.1	$ —	$ —	$ 139.1
Total non-U.S. defined benefit pension plan assets	$ 139.1	$ —	$ —	$ 139.1

(1) The Group elected to presents certain pension plan assets valued at net asset value per share as a practical expedient outside of the fair value hierarchy.

The following table reconciles the beginning and ending balances of plan assets measured at fair value using unobservable inputs (Level 3):

Fair Value Measurements of Plan Assets Using Significant Unobservable Inputs (Level 3)	Insurance Contracts Year ended December 31, 2022	2021
Balance at beginning of period	$ 139.1	$ 157.1
Actual return on assets	(30.9)	(1.1)
Settlements	(11.1)	(10.1)
Employer contributions	6.3	5.7
Plan participant contributions	1.5	1.7
Benefits paid	(5.0)	(4.0)
Acquisitions	-	0.7
Transfers out of Level 3, net	-	-
Currency impact	(7.4)	(10.9)
Balance at end of period	$ 92.5	$ 139.1

The asset allocation for the Group's pension plans as of December 31, 2022 and 2021, and the target allocation for 2023, by asset category are as follows:

Asset category	Target Allocation 2023	Allocation at December 31, 2022	2021
U.S. defined benefit pension plans:			
Equities	60.0 %	62.0 %	58.6 %
Debt	40.0 %	38.0 %	38.3 %
Other	—	—	3.1 %
Total U.S. defined benefit pension plans	100.0 %	100.0 %	100.0 %
Non-U.S. defined benefit pension plans:			
Insurance contracts	100.0 %	100.0 %	100.0 %
Total non-U.S. defined benefit pension plans	100.0 %	100.0 %	100.0 %

Concentration of Risk

The Group mitigates the credit risk of investments by establishing guidelines with investment managers that limit investment in any single issue or issuer to an amount that is not material to the portfolio being managed. These guidelines are monitored for compliance both by the Group and external managers. Credit risk related to derivative activity is mitigated by utilizing multiple counterparties and through collateral support agreements.

Defined Contribution Plans

The Group also offers defined contribution plans to eligible employees in the U.S. and in other countries, including Hong Kong, Korea, The Netherlands, Indonesia, Taiwan, and the United Kingdom. The defined contribution plans are comprised of a non-discretionary elective matching contribution component as well as a discretionary non-elective contribution component. Employees participate in the non-discretionary component by contributing a portion of their eligible compensation to the plan, which is partially matched by the Group. Non-elective contributions are made at the discretion of the Group and are based on a combination of eligible employee compensation and performance award targets. During the years ended December 31, 2022 and 2021, the Group contributed $15.0 million and $11.1 million, respectively, to the defined contribution plans.

Multiemployer Plans

In January 2022, the Group closed the multiemployer plan in The Netherlands for a closed population of employees, and the employees were provided with a defined contribution plan. The Group's contributions to the plan were generally determined as a percentage of the participants' salaries. During the year ended December 31, 2022, the Group made contributions of $0.6 million to the plan. During the year ended December 31, 2021 the Group recorded expense of $3.9 million, related to the plan, and made contributions of $3.9 million to the plan.

NOTE 18—SHARE-BASED COMPENSATION

Summary of Share-based Compensation Expense

Share-based compensation expense, which is recorded within "Selling, general and administrative expenses" in the consolidated statements of operations, was as follows for the years ended December 31, 2022 and 2021. Share amounts in the tables below are in whole numbers, unless otherwise indicated.

	Year Ended December 31,		As of December 31, 2022	
	2022	2021	Unrecognized Compensation Cost	Weighted Average Years
2014 Omnibus Plan Awards				
RSUs	$ 10.9	$ 8.0	$ 9.1	1.6
Option Awards	5.0	4.7	1.9	1.3
PSUs	2.7	2.5	3.7	1.8
Total share-based compensation expense	$ 18.6	$ 15.2		

2014 Omnibus Plan

In connection with the IPO, the Group's board of directors approved the 2014 Omnibus Plan, adopted on May 28, 2014 and amended on June 19, 2019, June 9, 2020, October 8, 2021, and June 14, 2022 under which 6.2 million ordinary shares is the maximum number that may be delivered upon satisfaction of awards granted. Following the IPO, all equity-based awards granted by the Group have been granted under the 2014 Omnibus Plan, which provides for awards of share options, share appreciation rights, restricted shares, unrestricted shares, share units, performance awards, cash awards and other awards convertible into or otherwise based on ordinary shares of the Group. Since the IPO, the board of directors of the Group has approved equity award grants for certain directors, executives, and employees, including RSUs, option awards, and PSUs. When these awards vest or exercise, shares are issued from shares authorized unless use of treasury shares is authorized by shareholders.

Restricted Share Units

The RSUs granted to executives and employees vest in full on the third anniversary of the date of grant, generally subject to the employee remaining continuously employed by the Group through the vesting date. RSUs granted to directors of the Group vest in full on the first anniversary of the date of grant. Upon a termination of employment due to an employee's death or retirement or a termination of employment by the Group without cause in connection with a restructuring or redundancy or due to the employee's disability prior to the vesting date, the RSUs will vest in full or in part, depending on the type of termination. In the event employment is terminated for cause, all unvested RSUs will be forfeited.

Compensation cost for RSUs is measured at grant date based on the fair value of the award and is recognized ratably as expense over the applicable vesting term. The fair value of RSUs is equal to the fair market value of the Group's ordinary shares based on the closing price on the date of grant. RSU award holders are entitled to an amount equal to any cash dividend paid by the Group upon one ordinary share for each RSU held by the award holder ("dividend equivalents"). The dividend equivalents are payable in cash only upon vesting of the associated RSUs and do not accrue interest.

The following table summarizes the activity for RSUs during the year ended December 31, 2022:

Restricted Share Units	Shares	Weighted Average Grant Date Fair Value per Share
Unvested, December 31, 2021	577,912	$ 41.96
Granted	213,211	49.75
Vested	(172,213)	49.22
Forfeited	(45,048)	45.09
Unvested, December 31, 2022	573,862	$ 42.43

The following table summarizes the weighted average grant date fair value per share of RSUs granted during the years ended December 31, 2022 and 2021 as well as the total fair value of awards vested during those periods:

	Restricted Share Units	
	Weighted Average Grant Date Fair Value per Share of Grants during Period	Total Fair Value of Awards Vested during Period
Year Ended December 31, 2022	$ 49.75	$ 8.5
Year Ended December 31, 2021	$ 58.26	$ 5.7

Option Awards

The option awards, which contain an exercise term of nine years from the date of grant, vest in three equal annual installments beginning on the first anniversary of the date of grant, generally subject to the employee remaining continuously employed on the applicable vesting date. Upon a termination of employment due to the employee's death or retirement or a termination of employment by the Group without cause in connection with a restructuring or redundancy or due to the employee's disability prior to a vesting date, the option awards will vest in full or will continue to vest on the original vesting schedule, depending on the type of termination. In the event employment is terminated for cause, all vested and unvested option awards will be forfeited.

Compensation cost for option awards is measured at the grant date based on the fair value of the award and is recognized as expense over the appropriate service period utilizing graded vesting. The following table summarizes the activity for option awards during the year ended December 31, 2022:

Option Awards	Shares	Weighted Average Exercise Price per share	Weighted Average Contractual Term (years)	Aggregate Intrinsic Value
Outstanding as of December 31, 2021	1,309,389	$ 48.78		
Granted	192,175	58.20		
Exercised	(119,179)	24.74		
Forfeited	(31,978)	51.64		
Expired	(20,724)	64.32		
Outstanding as of December 31, 2022	1,329,683	$ 51.99	5.7	$ 0.1
Exercisable as of December 31, 2022	804,776	$ 54.15	4.7	$ 0.1
Expected to vest as of December 31, 2022	524,907	$ 48.67	7.3	$ —

During the years ended December 31, 2022 and 2021, the total intrinsic value of option awards exercised was $3.1 million and $13.6 million, respectively. The fair value for option awards is computed using the Black-Scholes pricing model, whose inputs and assumptions are determined as of the date of grant. Determining the fair value of the option awards requires considerable judgment, including estimating the expected term of said awards and the expected volatility of the price of the Group's ordinary shares.

The expected volatility used in the Black-Scholes model for option awards granted is based on the publicly traded history of the Group's ordinary shares. The expected term of option awards represents the period of time that option awards granted are expected to be outstanding. For all grants of option awards presented herein, the simplified method was used to calculate the expected term, given the Group's limited historical exercise data. The risk-free interest rate for the periods within the expected term of option awards is based on the U.S. Treasury yield curve in effect at the time of grant. The dividend yield is estimated based on historical and expected dividend activity.

The following are the weighted average assumptions used within the Black-Scholes pricing model for grants during the years ended December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Expected term (in years)	5.50	5.50
Expected volatility	48.72 %	48.69 %
Risk-free interest rate	1.97 %	0.79 %
Dividend yield	2.00 %	1.81 %

Utilizing the above assumptions, the weighted average grant date fair value per option award granted in the years ended December 31, 2022 and 2021 was $22.51 and $22.55, respectively.

Performance Share Units

PSUs, which are granted to executives, cliff vest on the third anniversary of the date of grant, generally subject to the executive remaining continuously employed by the Group through the vesting date and achieving certain performance conditions. The number of the PSUs that vest upon completion of the service period can range from 0% to 200% of the original grant, subject to certain limitations, contingent upon the Group's total shareholder return during the performance period relative to a pre-defined set of industry peer companies. Upon a termination of employment due to the executive's death or retirement, or termination in connection with a change in control or other factors prior to the vesting date, the PSUs will vest in full or in part, depending on the type of termination and the achievement of the performance conditions. Dividend equivalents accumulate on PSUs during the vesting period, are payable in cash, and do not accrue interest.

The following table summarizes the activity for PSU awards during the year ended December 31, 2022, at target:

Performance Share Units	Shares	Weighted Average Grant Date Fair Value per Share
Unvested, December 31, 2021	172,929	$ 43.32
Granted	63,317	57.47
Vested	(46,028)	54.01
Cancelled (1)	(6,878)	54.01
Unvested, December 31, 2022	183,340	$ 45.12

(1) During the year ended December 31, 2022, PSU award recipients earned 87% of the target PSU awards granted in 2019 based upon the Group's total shareholder return relative to a pre-defined set of industry peer companies. As a result, the remaining 13% of the associated PSU awards were cancelled.

The fair value for PSU awards is computed using a Monte Carlo valuation model, whose inputs and assumptions are determined as of the date of grant. Determining the fair value of the PSU awards requires considerable judgment, including estimating the expected volatility of the price of the Group's ordinary shares, the correlation between the Group's share price and that of its peer companies, and the expected rate of interest. The expected volatility for each grant is determined based on the historical volatility of the Group's ordinary shares. The expected term of PSU awards represents the length of the performance period. The risk-free interest rate is based on the U.S. Treasury yield curve in effect at the time of grant for a duration equivalent to the performance period. The share price is the closing price of the Group's ordinary shares on the grant date.

The following are the weighted average assumptions used within the Monte Carlo valuation model for grants during the years ended December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Expected term (in years)	3.00	3.00
Expected volatility	57.30 %	58.00 %
Risk-free interest rate	1.73 %	0.20 %
Share price	$ 58.64	$ 61.06

Utilizing the above assumptions, the total grant date fair value for PSU awards granted in the years ended December 31, 2022 and 2021 was $3.6 million and $3.0 million, respectively.

NOTE 19—RELATED PARTY TRANSACTIONS

The Group did not have any significant related party transactions during the years ended December 31, 2022 and 2021.

NOTE 20—SEGMENTS

The Engineered Materials segment includes the Group's compounds and blends products sold into higher growth and value applications, such as consumer electronics and medical, as well as soft thermoplastic elastomers ("TPEs") products which are sold into markets such as footwear and automotive. Additionally, following the PMMA Acquisition and the Aristech Surfaces Acquisition in 2021, the Engineered Materials segment also includes PMMA and MMA products, which are sold into a variety of applications including automotive, building & construction, medical, consumer electronics, and wellness, among others. The Latex Binders segment produces styrene-butadiene latex ("SB latex") and other latex polymers and binders, primarily for coated paper and packaging board, carpet and artificial turf backings, as well as a number of performance latex binders applications, such as adhesive, building and construction and the technical textile paper market. The Base Plastics segment contains the results of the acrylonitrile-butadiene-styrene ("ABS"), styrene-acrylonitrile ("SAN"), and polycarbonate ("PC") businesses, as well as compounds and blends for automotive and other applications. On January 1, 2023, the Base Plastics segment was renamed to Plastics Solutions to better reflect Trinseo's strategic focus on providing solutions in areas such as sustainability and material substitution. The Polystyrene segment includes a variety of general purpose polystyrenes ("GPPS") and polystyrene that has been modified with polybutadiene rubber to increase its impact resistant properties ("HIPS"). The Feedstocks segment includes the Group's production and procurement of styrene monomer outside of North America, which is used as a key raw material in many of the Group's products, including polystyrene, SB latex, and ABS resins. Lastly, the Americas Styrenics segment consists solely of the operations of the Group's 50%-owned joint venture, Americas Styrenics, a producer of both styrene monomer and polystyrene primarily in North America.

The following table provides disclosure of the Group's segment Adjusted EBITDA, which is used to measure segment operating performance and is defined below, for the years ended December 31, 2022 and 2021. Asset and intersegment sales information by reporting segment is not regularly reviewed or included with the Group's reporting to the chief operating decision maker. Therefore, this information has not been disclosed below. Refer to Note 3 for the Group's net sales to external customers by segment for the years ended December 31, 2022 and 2021.

Year ended (1)	Engineered Materials	Latex Binders	Base Plastics	Polystyrene	Feedstocks	Americas Styrenics	Corporate Unallocated	Total
December 31, 2022								
Equity in earnings of unconsolidated affiliates	$ —	$ —	$ —	$ —	$ —	$ 102.0	$ —	$ 102.0
Adjusted EBITDA(1)	71.6	110.8	91.0	99.3	(75.2)	102.0		
Investment in unconsolidated affiliates	—	—	—	—	—	252.1	—	252.1
Depreciation and amortization	110.7	25.3	24.0	10.1	45.0	—	21.8	236.9
Capital expenditures	32.9	28.3	9.0	10.0	4.9	—	63.1	148.2
December 31, 2021								
Equity in earnings of unconsolidated affiliates	$ —	$ —	$ —	$ —	$ —	$ 110.7	$ —	$ 110.7
Adjusted EBITDA(1)	94.8	106.5	314.2	183.1	33.7	110.7		
Investment in unconsolidated affiliates	—	—	—	—	—	245.0	—	245.0
Depreciation and amortization	71.9	25.1	23.4	10.0	11.5	—	25.6	167.5
Capital expenditures	28.7	29.3	11.9	9.6	13.4	—	24.8	117.7

(1) The Group's primary measure of segment operating performance is Adjusted EBITDA, which is defined as income from continuing operations before interest expense, net; provision for income taxes; depreciation and amortization expense; loss on extinguishment of long-term debt; asset impairment charges; gains or losses on the dispositions of businesses and assets; restructuring charges; acquisition related costs and benefits, and other items. Segment Adjusted EBITDA is a key metric that is used by management to evaluate business performance in comparison to budgets, forecasts, and prior year financial results, providing a measure that management believes reflects core operating performance by removing the impact of transactions and events that would not be considered a part of core operations. Other companies in the industry may define segment Adjusted EBITDA differently than the Group, and as a result, it may be difficult to use segment Adjusted EBITDA, or similarly-named financial measures, that other companies may use to compare the performance of those companies to the Group's segment performance.

The reconciliation of income before income taxes to segment Adjusted EBITDA is as follows:

	2022	2021
Income (loss) from continuing operations before income taxes	$ (433.6)	$ 332.3
Interest expense, net	112.9	79.4
Depreciation and amortization	236.9	167.5
Corporate Unallocated(2)	88.0	95.6
Adjusted EBITDA Addbacks(3)	395.3	168.2
Segment Adjusted EBITDA	$ 399.5	$ 843.0

(2) Corporate unallocated includes corporate overhead costs and certain other income and expenses.

(3) Adjusted EBITDA addbacks for the years ended December 31, 2022 and 2021 are as follows:

	Year Ended December 31,	
	2022	2021
Net gain on disposition of businesses and assets	$ (1.8)	$ (0.6)
Restructuring and other charges (Note 21)	15.9	9.0
Acquisition transaction and integration net costs (Note 4)	6.6	75.3
Acquisition purchase price hedge (gain) loss (Note 13)	—	22.0
Asset impairment charges or write-offs (Note 14)	6.3	6.8
European Commission request for information (Note 16)	—	36.2
Goodwill impairment charges (Note 10)	297.1	—
Other items [(a)]	71.2	19.5
Total Adjusted EBITDA Addbacks	$ 395.3	$ 168.2

(a) Other items for the years ended December 31, 2022 and 2021 primarily relate to fees incurred in conjunction with certain of the Group's strategic initiatives, including our ERP upgrade project.

Geographic Information

As of December 31, 2022, the Group operates 39 manufacturing plants and one recycling facility at 33 sites in 15 countries, inclusive of its joint venture. It also operates 11 R&D facilities globally, including technology and innovation development centers. Sales are attributed to geographic areas based on the location where sales originated; long-lived assets are attributed to geographic areas based on asset location. The Group is incorporated under the existing laws of Ireland, as discussed in Note 1, which therefore represents its country of domicile. The Group has no sales generated from this country. The Group has $3.1 million of existing long-lived assets generated from this country as of December 31, 2022. The Group had no existing long-lived assets generated from this country as of December 31, 2021.

	As of and for the Year Ended December 31,	
	2022	2021
United States		
Sales to external customers	$ 1,236.3	$ 928.7
Long-lived assets	190.0	184.9
Right-of-use assets - operating, net	20.1	19.5
Europe		
Sales to external customers	$ 2,684.8	$ 2,755.8
Long-lived assets	388.0	410.3
Right-of-use assets - operating, net	52.3	61.9
Asia-Pacific		
Sales to external customers	$ 914.9	$ 1,048.8
Long-lived assets	107.6	114.5
Right-of-use assets - operating, net	3.7	3.9
Rest of World		
Sales to external customers	$ 129.5	$ 94.2
Long-lived assets	5.5	9.3
Right-of-use assets - operating, net	—	—
Total		
Sales to external customers[(1)]	$ 4,965.5	$ 4,827.5
Long-lived assets[(2)]	691.1	719.0
Right-of-use assets - operating, net[(3)]	76.1	85.3

(1) Sales to external customers in Germany represented approximately 10% of the total for the year ended December 31, 2022, and approximately 12% of the total for the year ended December 31, 2021. Sales to external customers in

Hong Kong represented approximately 9% and 11% of the total for the years ended December 31, 2022 and 2021, respectively. Sales to external customers in the Netherlands represented approximately 8% of the total for each of the years ended December 31, 2022 and 2021.

(2) Long-lived assets in Germany represented approximately 12% and 12% of the total as of December 31, 2022 and 2021, respectively. Long-lived assets in The Netherlands represented approximately 13% and 14% of the total as of December 31, 2022 and 2021, respectively. Long-lived assets in Italy represented approximately 21% and 22% of the total as of December 31, 2022 and 2021, respectively. Long-lived assets consist of property, plant and equipment, net, and finance lease ROU assets, net.

Operating lease ROU assets in The Netherlands represented approximately 46% and 48% of the total as of December 31, 2022 and 2021, respectively. Operating lease ROU assets in Ireland represented approximately 10% of the total as of December 31, 2022 and 2021.

NOTE 21—RESTRUCTURING

Refer to the narrative below for discussion of the Group's restructuring activities included in the tables below. Restructuring charges are included within "Selling, general and administrative expenses" in the consolidated statements of operations. The following table provides detail of the Group's restructuring charges for the years ended December 31, 2022 and 2021:

	Year Ended December 31,		Cumulative Life-to-date	
	2022	**2021**	**Charges**	**Segment**
Asset Restructuring Plan				
Feedstocks:				
Accelerated depreciation	$ 35.1	$ —	$ 35.1	Feedstocks
Employee termination benefits	3.9	—	3.9	Feedstocks
Contract terminations	0.4	—	0.4	Feedstocks
Decommissioning and other	3.3	—	3.3	Feedstocks
Base Plastics:				
Accelerated depreciation	1.4	—	1.4	Base Plastics
Employee termination benefits	3.4	—	3.4	Base Plastics
Engineered Materials:				
Accelerated depreciation	3.2	—	3.2	Engineered Materials
Employee termination benefits	2.4	—	2.4	Engineered Materials
Decommissioning and other	3.6	—	3.6	Engineered Materials
Asset Restructuring Plan subtotal	$ 56.7	$ —	$ 56.7	
Corporate Restructuring Program				
Accelerated depreciation	$ —	$ (0.4)	$ 2.5	
Employee termination benefits	(1.3)	0.3	17.1	
Contract terminations	—	—	2.8	
Decommissioning and other	0.1	—	0.3	
Corporate Restructuring Program Subtotal	$ (1.2)	$ (0.1)	$ 22.7	N/A(1)
Transformational Restructuring Program				
Employee termination benefits	$ 0.1	$ 8.7	$ 8.8	
Transformational Restructuring Program Subtotal	$ 0.1	$ 8.7	$ 8.8	N/A(1)
Other Restructurings	—	—		Various
Total Restructuring Charges	$ 55.6	$ 8.6		

(1) As this was identified as a corporate-related activity, the charges related to this restructuring program were not allocated to a specific segment, but rather included within corporate unallocated.

Refer to Note 16 for further information regarding the asset retirement obligation. The following tables provide a rollforward of the other liability balances associated with the Group's restructuring activities as of December 31, 2022 and 2021. Employee termination benefit and contract termination charges are primarily recorded within "Current provisions" in the consolidated balance sheets. The liability balance as of December 31, 2022 primarily represents activity related to the asset restructuring plan and transformational restructuring program. The liability balance as of December 31, 2021 primarily represents activity related to the transformational restructuring program. No other individual restructuring activity had a material liability balance as of December 31, 2022 or 2021.

	Balance at December 31, 2021	Expenses	Deductions[1]	Balance at December 31, 2022
Employee termination benefits	$ 10.0	$ 8.3	$ (5.0)	$ 13.3
Contract terminations	—	0.4	(0.4)	—
Decommissioning and other	—	0.1	(0.1)	—
Total	$ 10.0	$ 8.8	$ (5.5)	$ 13.3

	Balance at December 31, 2020	Expenses	Deductions[1]	Balance at December 31, 2021
Employee termination benefits	$ 7.9	$ 9.0	$ (6.9)	$ 10.0
Contract terminations	0.1	—	(0.1)	—
Total	$ 8.0	$ 9.0	$ (7.0)	$ 10.0

(1) Includes primarily payments made against the existing accrual, as well as immaterial impacts of foreign currency remeasurement.

Asset Restructuring Plan

In December 2022, the Group announced an asset restructuring plan designed to reduce costs, improve profitability, reduce exposure to cyclical markets and elevated natural gas prices, and address market overcapacity. The asset restructuring plan encompasses closure of certain underperforming or uncompetitive plants and product lines, including (i) closure of manufacturing operations at the styrene production facility in Boehlen, Germany, (ii) closure of one of its production lines at the Stade, Germany polycarbonate plant, and (iii) closure of the PMMA sheet manufacturing site in Matamoros, Mexico.

The program is expected to be substantially completed by the end of 2024. During the fourth quarter of 2022, the Group incurred accelerated depreciation charges of $39.7 million, employee termination benefit charges of $9.7 million, and contract termination charges of $0.4 million. The majority of these charges are expected to be paid throughout 2023. The accelerated depreciation charges included $35.1 million related to the asset retirement obligation at Boehlen, Germany. Refer to Note 16 for further information on the asset retirement obligation. The Group also incurred decommissioning and other charges of $6.9 million during the fourth quarter of 2022, which included a write-down of inventory and a reserve on a value-added tax receivable.

The Group expects to incur an incremental $20.1 million of contract termination charges, $5.1 million of decommissioning and other charges, and a limited amount of incremental employee termination benefit charges, the majority of which is expected to be paid by the end of 2024. The Group also expects to incur incremental accelerated depreciation charges of $3.2 million. Of the total incremental charges, $21.6 million is expected to be incurred in the Feedstocks segment, $1.6 million is expected to be incurred in the Base Plastics segment, and $5.2 million is expected to be incurred in the Engineered Materials segment.

Substantive production at the Boehlen facility and the one production line at the Stade facility ceased in 2022, and decommissioning activities began in December 2022. Substantive production at the Matamoros facility ceased in the first quarter of 2023.

On April 4, 2023, the Company entered into an agreement to sell its land, buildings and equipment in Matamoros, Mexico for a cash consideration of approximately $19.0 million. The transaction is expected to close in the second quarter of 2023.

Transformational Restructuring Program

In May 2021, the Group approved the transformational restructuring program associated with the Group's recent strategic initiatives. In connection with this restructuring program, during the year ended December 31, 2022, the Group incurred employee termination benefits charges of $0.1 million. The transformational restructuring program was substantially completed as of December 31, 2022, and the Group expects the employee benefit liability to be paid in 2023. As this was identified as a corporate-related activity, the charges related to this restructuring program were not allocated to a specific segment, but rather included within corporate unallocated.

Corporate Restructuring Program

In November 2019, the Group announced the corporate restructuring program associated with the Group's shift to a global functional structure and business excellence initiatives to drive greater focus on business process optimization and efficiency, which continued through the year ended December 31, 2022. The corporate restructuring program is completed as of December 31, 2022.

NOTE 22—ACCUMULATED OTHER COMPREHENSIVE INCOME (LOSS)

The components of accumulated other comprehensive income (loss), net of income taxes, consisted of:

Year Ended December 31, 2022 and 2021	Cumulative Translation Adjustments	Pension & Other Postretirement Benefit Plans, Net	Cash Flow Hedges, Net	Total
Balance as of December 31, 2020	$ (109.0)	$ (71.9)	$ (5.2)	$ (186.1)
Other comprehensive income (loss)	(5.3)	28.4	3.4	26.5
Amounts reclassified from AOCI to net income(1)	—	9.9	2.5	12.4
Balance as of December 31, 2021	$ (114.3)	$ (33.6)	$ 0.7	$ (147.2)
Other comprehensive income (loss)	(36.9)	65.0	(14.9)	13.2
Amounts reclassified from AOCI to net income(1)	—	(2.4)	5.1	2.7
Balance as of December 31, 2022	$ (151.2)	$ 29.0	$ (9.1)	$ (131.3)

(1) The following is a summary of amounts reclassified from AOCI to net income for the years ended December 31, 2022 and 2021.

AOCI Components	Amount Reclassified from AOCI Year Ended December 31, 2022	 2021	Statement of Operations Classification
Cash flow hedging items			
Foreign exchange cash flow hedges	$ —	$ (1.0)	Cost of sales
Commodity cash flow hedges	6.1	—	Cost of sales
Interest rate swaps	1.2	3.5	Interest expense, net
Total before tax	7.3	2.5	
Tax effect	(2.2)	—	Provision for (benefit from) income taxes
Total, net of tax	$ 5.1	$ 2.5	
Amortization of pension and other postretirement benefit plan items			
Prior service credit	$ (0.5)	$ (0.9)	(a)
Net actuarial loss	2.3	7.1	(a)
Curtailment and settlement (gain) loss	(4.0)	8.4	(a)
Total before tax	(2.2)	14.6	
Tax effect	(0.2)	(4.7)	Provision for (benefit from) income taxes
Total, net of tax	$ (2.4)	$ 9.9	

(a) These AOCI components are included in the computation of net periodic benefit costs. Refer to Note 17 for further information.

NOTE 23—EARNINGS PER SHARE

Basic earnings per ordinary share ("basic EPS") is computed by dividing net income available to ordinary shareholders by the weighted average number of the Group's ordinary shares outstanding for the applicable period. Diluted earnings per ordinary share ("diluted EPS") is calculated using net income available to ordinary shareholders divided by diluted weighted average ordinary shares outstanding during each period, which includes unvested RSUs, option awards, and PSUs. Diluted EPS considers the impact of potentially dilutive securities except in periods in which there is a loss because the inclusion of the potential ordinary shares would have an anti-dilutive effect.

The following table presents basic EPS and diluted EPS for the years ended December 31, 2022 and 2021.

	Year Ended December 31,	
(in millions, except per share data)	**2022**	**2021**
Earnings:		
Net income (loss) from continuing operations	$ (392.0)	$ 261.4
Net income (loss) from discontinued operations	(2.9)	160.4
Net income (loss)	$ (394.9)	$ 421.8
Shares:		
Weighted average ordinary shares outstanding	35.9	38.7
Dilutive effect of RSUs, option awards, and PSUs[1]	—	0.9
Diluted weighted average ordinary shares outstanding	35.9	39.6
Income (loss) per share:		
Income (loss) per share—basic:		
Continuing operations	(10.90)	6.75
Discontinued operations	(0.08)	4.14
Income (loss) per share—basic	$ (10.98)	$ 10.89
Income (loss) per share—diluted:		
Continuing operations	(10.90)	6.60
Discontinued operations	(0.08)	4.05
Income (loss) per share—diluted	$ (10.98)	$ 10.65

(1) Refer to Note 18 for discussion of RSUs, option awards, and PSUs granted to certain Company directors and employees. As the Group recorded a net loss from continuing operations for the year ended December 31, 2022, potential shares related to equity-based awards have been excluded from the calculation of diluted EPS, as doing so would be anti-dilutive. The number of anti-dilutive shares that have been excluded in the computation of diluted earnings per share were 0.6 million for the year ended December 31, 2021.

NOTE 24 – LEASES

The Group's ROU assets and lease liabilities are classified on its consolidated balance sheets as follows:

	December 31, 2022	December 31, 2021	Location on Balance Sheet
Operating lease ROU assets, net	$ 76.1	$ 85.3	Right-of-use assets - operating, net
Finance lease ROU assets, net	7.7	3.7	Property, plant, and equipment, net of accumulated depreciation
Operating lease liabilities - current portion	17.1	18.4	Current lease liabilities - operating
Operating lease liabilities - noncurrent portion	60.2	69.2	Noncurrent lease liabilities - operating
Finance lease liabilities - current portion	1.5	2.7	Short-term borrowings and current portion of long-term debt
Finance lease liabilities - noncurrent portion	6.2	1.0	Long-term debt, net of unamortized deferred financing fees

The components of the Group's lease costs are classified on its consolidated statements of operations as follows:

	Year Ended December 31, 2022	Year Ended December 31, 2021
Finance lease cost:		
Amortization of lease ROU assets	$ 2.4	$ 2.7
Interest on lease liabilities	0.1	0.1
Operating lease cost:	21.3	20.7
Variable lease cost	0.3	0.1
Total lease cost	$ 24.1	$ 23.6

The table below shows the cash and non-cash activity related to the Group's lease liabilities during the period:

	Year Ended December 31, 2022	Year Ended December 31, 2021
Cash paid related to lease liabilities:		
Operating cash flows from operating leases	$ 22.3	$ 21.4
Operating cash flows from finance leases	0.1	0.1
Financing cash flows from finance leases	2.4	2.7
Non-cash lease liability activity:		
ROU assets obtained in exchange for new operating lease liabilities	$ 12.2	$ 29.0
ROU assets obtained in exchange for new finance lease liabilities	6.3	0.2

As of December 31, 2022, the maturities of the Group's operating and finance lease liabilities were as follows:

	Maturity of lease liabilities by year								
	2023	2024	2025	2026	2027	Thereafter	Total Lease Payments	Less Imputed Interest	Lease Liability
Operating leases	$ 17.6	$ 14.7	$ 11.0	$ 8.0	$ 7.2	$ 28.9	$ 87.4	$ (10.1)	$ 77.3
Finance leases	$ 2.3	$ 1.7	$ 1.6	$ 1.6	$ 1.6	$ 0.1	$ 8.9	$ (1.2)	$ 7.7
Total	$ 19.9	$ 16.4	$ 12.6	$ 9.6	$ 8.8	$ 29.0	$ 96.3	$ (11.3)	$ 85.0

The following table summarizes the weighted average remaining lease terms and the weighted average discount rates as of December 31, 2022 and 2021:

	As of December 31,	
	2022	2021
Operating leases:		
Weighted average remaining lease term (in years)	7.6	7.9
Weighted average discount rate	3.4 %	3.4 %
Finance leases:		
Weighted average remaining lease term (in years)	4.9	2.0
Weighted average discount rate	6.3 %	2.8 %

As of December 31, 2022, the Group does not have any additional operating leases that have not yet commenced.

The following table shows the annual changes in the Group’s operating ROU assets from December 31, 2021 through December 31, 2022. The annual changes in the Group’s finance ROU assets from December 31, 2021 through December 31, 2022 are included within “Other property” in Note 9.

	Operating ROU Asset Cost	Operating Accumulated amortization
At December 31, 2021	$ 130.5	$ (45.2)
Additions and Modifications	12.2	—
Terminations	(0.1)	—
Amortization expense	—	(18.7)
Currency translation	(7.8)	5.2
At December 31, 2022	$ 134.8	$ (58.7)
Net book value:		
At December 31, 2021	$ 85.3	
At December 31, 2022	$ 76.1	

NOTE 25—IMPAIRMENT AND OTHER CHARGES

Impairment and other charges consisted of the following:

	Year Ended December 31,	
	2022	2021
Asset impairment charges or write-offs (Note 14)	$ 6.3	$ 6.8
European Commission request for information (Note 16)	—	36.2
Goodwill impairment charges (Note 10)	297.1	—
Total	$ 303.4	$ 43.0

NOTE 26 – PROVISIONS

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

	Note	Year Ended December 31, 2022	2021
Provisions for liabilities:			
Amounts falling due within one year:			
European Commission request for information	16	$ —	$ 36.2
Restructuring	21	13.3	10.0
Pension benefits	17	5.0	4.7
Environmental	2, 16	3.5	4.4
Asset retirement obligation	16	25.3	—
Total:		$ 47.1	$ 55.3
Amounts falling due after more than one year:			
Pension benefits	17	172.8	270.0
Provision for uncertain tax positions	15	7.8	9.4
Asset retirement obligation	16	10.5	—
Total:		$ 191.1	$ 279.4

The following table provides a rollforward of the provision balance associated with the Group's environmental remediation costs and uncertain tax positions as of December 31, 2022. Environmental remediation charges, current pension benefits obligations, and restructuring charges are recorded within "Current provisions" in the consolidated balance sheet. Uncertain tax positions and noncurrent pension benefit obligations are recorded within "Noncurrent provisions" in the consolidated balance sheet. Refer to Note 17 and Note 21 for a rollforward of the pension benefits and restructuring provision balances, respectively.

	Environmental	Uncertain tax positions	Total
Balance, December 31, 2021	$ 4.4	$ 9.4	$ 13.8
Additions	—	1.0	1.0
Reductions	—	(2.3)	(2.3)
Currency translation and other	(0.9)	(0.3)	(1.2)
Balance, December 31, 2022	$ 3.5	$ 7.8	$ 11.3

NOTE 27 – DIRECTORS' REMUNERATION

On the Redomiciliation, all directors from Trinseo S.A. became the Directors of Trinseo PLC. For the period from the December 31, 2021 to December 31, 2022, director remuneration included $1.7 million of emoluments, which included fees earned for the services of the non-executives, and salary earned by the Chief Executive Officer. The Chief Executive Officer was not provided additional compensation for his service as a director. No benefits were earned under the long-term incentive plan after the Redomiciliation.

The consolidated financial statements have been presented with comparatives information based on the historical operations of Trinseo S.A., therefore, directors' remuneration presented in the table below for fiscal years 2022 and 2021 are presented on that basis.

	Year Ended December 31, 2022	2021
Emoluments	$ 3.0	$ 4.5
Benefits under long term incentive plan	4.3	4.1
Gain on exercise of stock options	1.4	—
Total directors' remuneration	$ 8.7	$ 8.6

NOTE 28 – AUDITORS' REMUNERATION

Auditors' remuneration to PricewaterhouseCoopers Ireland and its affiliates for the years ended December 31, 2022 and 2021 were as follows:

	Year Ended December 31, 2022	Year Ended December 31, 2021
Audit of the consolidated and parent company financial statements	$ 7.3	$ 8.2
Other assurance services	7.1	0.9
Tax advisory fees	0.2	—
Total auditors' remuneration	$ 14.6	$ 9.1

NOTE 29– EMPLOYEES

The average number of persons employed by the Group for the years ended December 31, 2022 and 2021 were as follows:

	2022	2021
Manufacturing	2,133	2,052
Research and development	208	249
Selling, general, and administrative	1,062	967
Total employees	3,403	3,268

Employee costs for the years ended December 31, 2022 and 2021 were as follows:

	2022	2021
Wages and salaries(1)	$ 321.1	$ 336.6
Social insurance costs	18.4	15.9
Share-based compensation	18.8	14.2
Other retirement benefits costs	27.1	27.2
Other compensation costs	9.7	7.6
Total employee costs	$ 395.1	$ 401.5

(1) Of the total cost for wages and salaries, there were $2.4 million and $0.8 million, respectively, capitalized for the years ended December 31, 2022 and 2021.

NOTE 30 - SUBSIDIARIES

A complete listing of subsidiaries with associated jurisdiction and share capital held as of January 31, 2023 is as follows:

Entity Name	Jurisdiction	Ownership by Trinseo PLC (Indirect or Direct)	Percent Ownership
Trinseo Belgium B.V.	Belgium	Indirect	100%
Trinseo Operating Belgium B.V.	Belgium	Indirect	100%
Trinseo Canada ULC	Canada	Indirect	100%
Styron Synthetic Materials (Shanghai) Company Limited	China	Indirect	100%
Trinseo Polymers (Zhangjiagang) Company Limited	China	Indirect	100%
Altuglas International Denmark A/S	Denmark	Indirect	100%
Trinseo Suomi Oy	Finland	Indirect	100%
Altuglas International SAS	France	Indirect	100%
Styron Operating France SAS	France	Indirect	100%
Trinseo France S.A.S	France	Indirect	100%
Trinseo Deutschland Anlagengesellschaft MbH	Germany	Indirect	100%
Trinseo Deutschland GmbH	Germany	Indirect	100%
Trinseo Deutschland RE GmbH & Co. KG	Germany	Indirect	100%
Trinseo Deutschland RE GP GmbH	Germany	Indirect	100%
Trinseo (Hong Kong) Limited	Hong Kong	Indirect	100%
Trinseo Materials (Hong Kong) Limited	Hong Kong	Indirect	100%
Trinseo India Trading Private Limited	India	Indirect	100%
PT Trinseo Materials Indonesia	Indonesia	Indirect	100%
PT Trinseo Operating Indonesia	Indonesia	Indirect	100%
Styron Ireland IHB Limited	Ireland	Indirect	100%
Trinseo Finance Ireland Unlimited Company	Ireland	Indirect	100%
Trinseo Ireland Global IHB Limited	Ireland	Indirect	100%
Trinseo Ireland Holdings Limited	Ireland	Indirect	100%
Trinseo Services Ireland Limited	Ireland	Indirect	100%
A.P.I. Applicazioni Plastiche Industriali S.p.A.	Italy	Indirect	100%
Altuglas S.r.l.	Italy	Indirect	100%
Styron Operating Italy S.r.l.	Italy	Indirect	100%
Trinseo Italia S.R.L.	Italy	Indirect	100%
Trinseo Japan Y.K.	Japan	Indirect	100%
Trinseo Korea Ltd.	Korea	Indirect	100%
Trinseo Holding S.à r.l.	Luxembourg	Indirect	100%
Trinseo Luxco S.à r.l.	Luxembourg	Direct	100%
Trinseo Materials Operating S.C.A.	Luxembourg	Indirect	100%
Altuglas Mexico, S.A. de C.V.	Mexico	Indirect	100%
Trinseo de Mexico, S. de R.L. de C.V.	Mexico	Indirect	100%
Heathland B.V.	The Netherlands	Indirect	100%
Styron Netherlands Holding Company B.V.	The Netherlands	Indirect	100%
Styron Operating Netherlands B.V.	The Netherlands	Indirect	100%
Trinseo Holding B.V.	The Netherlands	Indirect	100%
Trinseo Netherlands B.V.	The Netherlands	Indirect	100%
Styron Poland sp. z.o.o.	Poland	Indirect	100%
Trinseo Holding Asia Pte. Ltd.	Singapore	Indirect	100%
Trinseo Singapore Pte. Ltd.	Singapore	Indirect	100%
Trinseo Spain S.L.	Spain	Indirect	100%
Trinseo Sverige AB	Sweden	Indirect	100%
Styron Europe Holding GmbH	Switzerland	Indirect	100%
Styron Export Operating GmbH	Switzerland	Indirect	100%
Trinseo Europe GmbH	Switzerland	Indirect	100%
Trinseo Export GmbH	Switzerland	Indirect	100%
Taiwan Trinseo Limited	Taiwan	Indirect	100%
Styron Operating Kimya Ticaret Limited Sirketi	Turkey	Indirect	100%
Trinseo Kimya Ticaret Limited Şirketi	Turkey	Indirect	100%
Trinseo UK Limited	England and Wales	Indirect	100%
Altuglas LLC	United States – Delaware	Indirect	100%
Americas Styrenics LLC	United States – Delaware	Indirect	50%
Styron AmSty Holdings LLC	United States – Delaware	Indirect	100%
Trinseo LLC	United States – Delaware	Indirect	100%
Trinseo Materials Finance, Inc.	United States – Delaware	Indirect	100%
Trinseo U.S. Holding, Inc.	United States – Delaware	Indirect	100%
Trinseo U.S. Receivables Company SPV LLC	United States – Delaware	Indirect	100%
Aristech Surfaces LLC	United States – Kentucky	Indirect	100%

NOTE 31 – APPROVAL OF FINANCIAL STATEMENTS

The Directors approved the consolidated financial statements on May 5, 2023.

NOTE 32 - SUBSEQUENT EVENTS

Subsequent events have been considered through to May 5, 2023, the date this Annual Report was approved by the Board of Directors. There were no subsequent events that would materially impact the Group’s financial statements since the balance sheet, other than those noted in Note 16 and Note 21 to consolidated financial statements.

Trinseo PLC
Company Balance Sheet
(in millions USD)

	December 31, 2022		December 31, 2021	
Fixed assets				
Financial assets – Investments in subsidiaries (Note 4)	$	2,244.1	$	2,242.5
	$	**2,244.1**	**$**	**2,242.5**
Current assets				
Debtors and other receivables (Note 5)	$	26.2	$	23.7
Cash at banks		0.2		12.3
Total current assets	**$**	**26.4**	**$**	**36.0**
Creditors (amounts falling due within one year)		(401.2)		(140.1)
Net current liabilities	**$**	**(374.8)**	**$**	**(104.1)**
Total assets less current liabilities	**$**	**1,869.4**	$	2,138.4
Creditors (amounts falling due after more than one year) (Note 6)		(0.4)		(0.7)
Net assets	**$**	**1,868.9**	**$**	**2,137.7**
Capital and reserves				
Called up share capital presented as equity (Note 7)	**$**	0.4	$	0.4
Share premium (Note 8)		10.0		10.4
Profit and loss account (Note 9)		1,835.3		2,122.7
Share-based compensation reserve		23.1		4.1
Shareholders' funds	**$**	**1,868.9**	**$**	**2,137.7**

The Company's loss after tax for the years ended December 31, 2022 and 2021 determined in accordance with Irish GAAP was $89.9 million and $13.5 million, respectively.

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

/s/ Frank Bozich
Frank Bozich
Director

/s/ K'Lynne Johnson
K'Lynne Johnson
Chair

Trinseo PLC
Company Statement of Changes in Equity
(in millions USD)

	Share capital		Share premium		Profit and loss account		Share-based compensation		Total
Balance, December 31, 2021	**$**	**0.4**	**$**	**10.4**	**$**	**2,122.7**	**$**	**4.1**	**$ 2,137.7**
Loss for year		—		—		(89.9)		—	(89.9)
Share vestings and option exercise		—		(0.4)		—		—	(0.4)
Share-based compensation reserve		—		—		—		19.0	19.0
Dividends		—		—		(47.5)		—	(47.5)
Repurchase of ordinary shares		—		—		(150.0)		—	(150.0)
Balance, December 31, 2022	**$**	**0.4**	**$**	**10.0**	**$**	**1,835.3**	**$**	**23.1**	**$ 1,868.9**

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

1. General Information

On July 27, 2021, Trinseo Limited was re-registered as an Irish public limited company, or PLC, and thereafter became known as Trinseo PLC. On October 8, 2021, Trinseo PLC completed its previously announced cross-border merger pursuant to which Trinseo S.A., a Luxembourg public limited company merged with and into Trinseo PLC, with Trinseo PLC surviving the merger (the "Merger"). As a result of the Merger, all of Trinseo S.A.'s outstanding ordinary shares (excluding any treasury shares), 38,837,083, par value $0.01 per share, were exchanged on a one-for-one basis for newly issued ordinary shares, nominal value of $0.01 per share, of Trinseo PLC, and Trinseo PLC assumed all of Trinseo S.A.'s rights and obligations, with all Trinseo S.A. shares being cancelled and Trinseo S.A. ceasing to exist as of the effective time of the Merger.

The company's registered office is Riverside One Sir John Rogerson's Quay, Dublin 2, D02 X576 Dublin, Ireland. The Company registration number is 562693.

2. Basis of Presentation

These financial statements have been prepared on a going concern basis and in compliance with Irish GAAP, including Financial Reporting Standard 102, 'The Financial Reporting Standard applicable in the UK and Republic of Ireland' ("FRS 102") and the Companies Act 2014.

The financial statements of Trinseo PLC as a stand-alone entity have been prepared on a historical cost convention.

The preparation of financial statements in conformity with FRS 102 requires the use of certain key assumptions concerning the future, and other key sources of estimation uncertainty at the reporting date. It also requires the directors to exercise its judgement in the process of applying the Company's accounting policies.

In accordance with section 304 of the Companies Act 2014, the Company is availing of the exemption from presenting its individual profit and loss account as part of the financial statements to be laid before members and to be annexed with the Company's annual return and from filing it with the Registrar of Companies. The Company's loss after tax for the years ended December 31, 2022 and 2021 determined in accordance with Irish GAAP was $89.9 million and $13.5 million, respectively.

The company's functional currency is in USD.

Disclosure exemptions

FRS 102 allows a qualifying entity certain disclosure exemptions. The Company is a qualifying entity and has availed of the following disclosure exemptions:
i) Exemption from the requirements of Section 7 of FRS 102 and FRS 102 paragraph 3.17(d) to present a statement of cash flows.
ii) Exemption from the financial instrument disclosure requirements of Section 11 paragraphs 11.39 to 11.48A and Section 12 paragraphs 12.26 to 12.29A of FRS 102 as the equivalent disclosures are included in the consolidated financial statements of the group in which the entity is consolidated.
iii) Exemption from certain disclosure requirements of Section 26 of FRS 102 (paragraphs 26.18(b), 26.19 to 26.21 and 26.23), in respect of share-based payments as the share-based payment concerns its own equity instruments and its separate financial statements are presented alongside the consolidated financial statements of the group; and the equivalent disclosures are included in the consolidated financial statements of the group in which the entity is consolidated.

iv) Exemption from the requirement of FRS 102 paragraph 33.7 to disclose key management personnel compensation in total.

The company is able to take advantage of the disclosure exemptions above as:

i. it otherwise applies the recognition, measurement and disclosure requirements of FRS 102; and

ii. it discloses in the notes to these financial statements a brief narrative summary of the disclosure exemptions adopted and the name of the parent of the group in whose consolidated financial statements its financial statements are consolidated, and from where those financial statements may be obtained.

3. Summary of Significant Accounting Policies

Investment in Subsidiaries

Investment in subsidiaries is recorded at cost, which equaled the estimated fair value on the date of the completion of the Merger, based on the market capitalization of Trinseo S.A. This is the Company's cost basis for its investment in its subsidiaries. The investment is tested for impairment if circumstances or indicators suggest that an impairment may exist.

Foreign currency

The Company's functional and presentation currency is the U.S. dollar. Transactions denominated in currencies other than the functional currency are translated into U.S. dollars using the spot exchange rates at the dates of the transactions.

Contingencies

Contingent liabilities, arising as a result of past events, are not recognized as a liability if it is not probable that the Company will be required to transfer economic benefits in settlement of the obligation, or the amount cannot be reliably measured. Possible but uncertain obligations are not recognized as liabilities but are contingent liabilities. Contingent liabilities are disclosed in the financial statements unless the probability of payment is remote. Contingent liabilities are considered a critical accounting estimate.

Financial instruments

The Company has chosen to apply the provisions of Sections 11 and 12 of FRS 102 to account for all its financial instruments.

Financial assets

Basic financial assets, including trade and other receivables, cash and cash equivalents are initially recognized at transaction price (including transaction costs), unless the arrangement constitutes a financing transaction. Where the arrangement constitutes a financing transaction the resulting financial asset is initially measured at the present value of the future receipts discounted at a market rate of interest for a similar debt instrument.

At the end of each financial year, financial assets measured at amortized cost are assessed for objective evidence of impairment. If there is objective evidence that a financial asset measured at amortized cost is impaired an impairment loss is recognized in profit and loss. The impairment loss is the difference between the financial asset's carrying amount and the present value of the financial asset's estimated cash inflows discounted at the asset's original effective interest rate. No impairments were recognized in the periods ended December 31, 2022 and December 31, 2021.

Financial assets are derecognized when (a) the contractual rights to the cash flows from the asset expire or are settled, or (b) substantially all the risks and rewards of ownership of the financial asset are transferred to another party or (c) control of the financial asset has been transferred to another party who has the practical ability to unilaterally sell the financial asset to an unrelated third party without imposing additional restrictions.

Financial liabilities

Basic financial liabilities, including accrued liabilities, and amounts due to related parties, are initially recognized at transaction price, unless the arrangement constitutes a financing transaction. Where the arrangement constitutes a financing transaction the resulting financial liability is initially measured at the present value of the future payments discounted at a market rate of interest for a similar debt instrument.

Amounts due to related parties, and financial liability from arrangements which constitute financing transactions are subsequently carried at amortized cost, using the effective interest method.

Financial liabilities are derecognized when the liability is extinguished, that is when the contractual obligation is discharged, cancelled or expires.

Taxation

Income tax expense for the financial year comprises current and deferred tax recognized in the financial year. Current or deferred tax assets and liabilities are not discounted. Current tax is the amount of income tax payable in respect of the taxable profit for the financial year or past financial years. Current tax is measured at the amount of current tax that is expected to be paid using tax rates and laws that have been enacted or substantively enacted by the end of the financial year.

Deferred tax is recognized in respect of all timing differences, which are differences between taxable profits and total comprehensive income as stated in the financial statements except in certain circumstances. Unrelieved tax losses and other deferred tax assets are recognized only when it is probable that they will be recovered against the reversal of deferred tax liabilities or other future taxable profits. These timing differences arise from the inclusion of income and expenses in tax assessments in financial years different from those in which they are recognized in financial statements. Deferred tax is measured using tax rates and laws that have been enacted or substantively enacted by the end of each financial year end and that are expected to apply to the reversal of the timing difference.

Share-Based Compensation

The Company measures share-based compensation expense at the grant date based on the fair value of the award and recognizes the compensation expense over the requisite service period, which is generally the vesting period. Share based compensation expense that relates to the employees of the Company’s subsidiaries is recognized as a capital contribution to the subsidiary with an increase in the carrying amount of the investment in subsidiary.

Called up share capital presented as equity and Share premium

The par value of ordinary shares on issuances is recorded as called up share capital presented as equity. Amounts received greater than the par value on issuances of the Company's ordinary share capital is recorded in share premium.

Dividends

Dividend income is recognized when the right to receive payment is established.

Dividends and other distributions may only be declared and paid out of the profits available for distribution under Irish law. Dividends and other distributions to the Company’s shareholders are recognized as a liability in the financial statements in the period in which the dividends and other distributions are approved by the shareholders. Dividends declared by the directors are recognized when paid. These amounts are recognized in the statement of changes in equity.

4. Financial assets – Investment in subsidiaries

The principal direct subsidiary of the Company is:

Name	Country of Incorporation and Principal Place of Business	Proportion of Ownership Interest at December 31, 2022
Trinseo LuxCo S.à r.l.	26, boulevard Royal, L-2449 Luxembourg, Luxembourg	100%

Company's investment in direct subsidiaries

At December 31, 2021	$	2,242.5
Additions during the period		19.0
Stock Compensation Recharges		(17.4)
At December 31, 2022	$	**2,244.1**

On June 14, 2021, the shareholders of the Trinseo S.A. approved a cross-border merger by acquisition between the Company and Trinseo S.A. (Note 7). As a consequence of the Merger, the Company acquired the participation into Trinseo LuxCo S.à r.l., which was previously owned 100% by Trinseo S.A.

The $19.0 million addition for the period is related to the Stock Compensation accruals for the year of 2022.

5. Debtors and other receivables

	December 31, 2022		December 31, 2021	
Amounts due from Group Companies	$	25.8	**$**	23.5
Other receivables	$	0.4	$	0.2
Total debtors and other receivables	$	**26.2**	$	**23.7**

6. Creditors

	December 31, 2022		December 31, 2021	
Amounts falling due within one year:				
Financing arrangements (a)	$	(357.8)	$	(106.0)
Amounts due to group companies		(40.5)		(27.6)
Trade payables and accrued liabilities		(2.9)		(6.5)
Total amounts falling due within one year	**$**	**(401.2)**	**$**	**(140.1)**
Amounts falling due after one year:				
Trade payables and accrued liabilities	$	(0.4)	$	(0.7)
Total amounts falling due after one year	**$**	**(0.4)**	**$**	**(0.7)**

(a) The financing arrangements mentioned in the table above are mainly related to working capital loan balance against Trinseo Ireland Global IHB. These loans bear interest at a rate equal to one-month LIBOR Reference Rate plus 2.85%.

7. Share Capital

Authorised

4,000,000,000 ordinary shares, par value of $0.01 each, 1,000,000,000 preferred shares, par value of €0.01 each, and 25,000 deferred ordinary shares par value €1.00 each on December 31, 2022.

Allotted and fully paid - presented as equity

On June 29, 2021, the shareholders of the Company resolved to re-designate the existing 150 issued ordinary shares of the Company as deferred ordinary shares. On June 30, 2021, the Company issued a further 24,850 deferred ordinary shares for €1 each to MFSD Nominees Limited.

On June 14, 2021, the shareholders of the Trinseo S.A. approved a cross-border merger by acquisition between the Company and Trinseo S.A. in accordance with the European Communities (Cross-Border Mergers) Regulations 2008, as amended from time to time and article 1021-5 of the Luxembourg law of August 10, 1915 on commercial companies as amended from time to time, whereby the assets and liabilities of Trinseo S.A. would be transferred by universal succession of title to the Company, and the shareholders in Trinseo S.A. (other than Trinseo S.A.) would receive one ordinary share in the Company for every ordinary share held in Trinseo S.A.. The Merger was also approved by the shareholders of the Company, and was approved by the Irish High Court with an effective date of October 8, 2021. As a result of the Merger the Company issued 38,837,083 ordinary shares with a par value of $0.01 each.

8. Share premium

As a consequence of the Merger, the Company issued 38,837,083 ordinary shares with a par value of $0.01 each to the former shareholders of Trinseo S.A. (other than Trinseo S.A. as holder of treasury shares in itself) in consideration of which Trinseo PLC acquired all of the assets of Trinseo S.A. and Trinseo S.A. ceased to exist. In accordance with the requirements of section 71(5) of the Companies Act 2014 and the common draft terms of merger between Trinseo PLC and Trinseo S.A. the new ordinary shares issued by Trinseo PLC were valued by reference to their fair market value (derived from the closing price of Trinseo S.A. shares on the effective date of the Merger), with the value per share in excess of nominal value being credited to the share premium account of the Company. The amount so credited to the share premium account was $2.2 billion.

Under Irish law, the Company may only make distributions or purchase its own shares if it has sufficient distributable profits.

Immediately following the Merger, Trinseo PLC did not have any distributable profits of its own. Accordingly, on September 9, 2021, the shareholders of Trinseo PLC approved a special resolution authorizing the reduction and cancellation of the entire amount standing to the credit of the share premium account of Trinseo PLC (or such lesser amount as may be approved by the board of directors of Trinseo PLC) resulting from the allotment and issue of new ordinary shares by Trinseo PLC under the terms of the Merger and further approving that the reserve arising as a result of such reduction and cancellation of the share premium be treated as profits available for distribution within the meaning of section 117 of the Companies Act 2014. In furtherance of that resolution, the board of directors of Trinseo PLC resolved on September 27, 2021 to approve the reduction of the share premium account by the entire amount standing to the credit of the share premium account of Trinseo immediately following the effective time of the Merger less $10.0 million. On November 4, 2021, the High Court of Ireland confirmed the creation of distributable profits for Trinseo PLC through the reduction of share premium of $2.2 billion. This resulted in a transfer of reserves from the share premium account to the profit and loss account of the same amount with effect from November 8, 2021 (being the date on which the order of the High Court approving the capital reduction was registered by the Registrar of Companies).

9. Other reserves

Profit and Loss account

The profit and loss account is comprised of the accumulated losses and the distributable profits created through the capital reduction summarized above. The profit and loss account is reduced by the acquisitions of the Company's own shares and / or, dividends paid by the Company.

Share-based compensation reserve

Share-based compensation expense in relation to equity instruments of the Company issued to employees of the Company’s subsidiaries is accounted for as a capital contribution to the relevant subsidiaries with an increase in equity for equity settled schemes.

10. Related Party Transactions

The Company is exempt from disclosing related party transactions with entities that are wholly owned within the group it heads.

11. Auditors' remuneration

In the years ended December 31, 2022 and 2021, $0.3 million and $0.2 million, respectively, was payable for the statutory audit of the parent individual accounts to its auditors, PricewaterhouseCoopers, Ireland.

12. Related parties transactions

The Company has availed of the exemption provided in Financial Reporting Standard 102, for wholly owned subsidiary undertakings of whose voting rights are controlled within the group, from the requirement to give details of transactions with entities that are part of the group.

13. Financial commitment and contingencies

At the financial year end no financial commitments and contingencies are in place.

14. Subsequent Events

On December 1, 2022 the Board of Directors authorized a quarterly dividend of $0.32 per share. The dividend consisted in a cash distribution of $11.9 million which was paid to the shareholders on January 19, 2023 of record as of the close of business on January 5, 2023.

15. Approval of financial statements

The financial statements were approved by the Directors on May 5, 2023.