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

(Mark One)

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

For the fiscal year ended December 31, 2022

OR

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

For the transition period from _____ to _____

Commission file number 001-39378

ORIGIN MATERIALS, INC.

(Exact name of registrant as specified in its charter)

Delaware

(State or other jurisdiction of
incorporation or organization)

87-1388928

(I.R.S. Employer
Identification No.)

930 Riverside Parkway, Suite 10
West Sacramento, CA

(Address of principal executive offices)

95605

(Zip Code)

(916) 231-9329

Registrant's telephone number, including area code

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

Title of each class:	Trading Symbol(s)	Name of each exchange on which registered:
Common Stock, \$0.0001 par value	ORGN	The NASDAQ Capital Market
per share		
Warrants	ORGNW	The NASDAQ Capital Market

Securities registered pursuant to section 12(g) of the Act:

Common Shares

(Title of class)

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

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

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

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

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

Large accelerated filer	<input checked="" type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

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

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

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

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

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

The aggregate market value of voting stock held by non-affiliates of the Registrant on June 30, 2022, based on the closing price of \$5.12 for shares of the Registrant’s common stock as reported by the Nasdaq Capital Market, was approximately \$630.1 million. Shares of common stock beneficially owned by each executive officer, director, and holder of more than 10% of our common stock have been excluded in that such persons may be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

The registrant had issued and outstanding an aggregate of 143,099,850 shares of common stock as of February 16, 2023.

Documents Incorporated by Reference

Specified portions of the registrant’s definitive proxy statement to be issued in conjunction with the registrant’s 2023 Annual Meeting of Stockholders, which is expected to be filed not later than 120 days after the registrant’s fiscal year ended December 31, 2022 ("Proxy Statement"), are incorporated by reference into Part III of this Annual Report on Form 10-K (this "Annual Report"). Except as expressly incorporated by reference, the registrant’s Proxy Statement shall not be deemed to be a part of this Annual Report.

INTRODUCTORY NOTE

Origin Materials, Inc., formerly known as Artius Acquisition Inc. ("Artius"), was originally registered under the Companies Law of the Cayman Islands on January 24, 2020, as a special purpose acquisition company formed for the purpose of effecting a merger, capital stock exchange, asset acquisition, stock purchase, reorganization, or other similar business combination with one or more target businesses. On June 25, 2021, we consummated the previously announced merger pursuant to that certain Agreement and Plan of Merger and Reorganization, dated as of February 16, 2021 (as amended by the letter agreement dated March 5, 2021, as it may be further amended from time to time) (the "Merger Agreement"), by and among Artius, Zero Carbon Merger Sub Inc., a Delaware corporation and a direct, wholly owned subsidiary of Artius (the "Merger Sub"), and Micromidas, Inc., a Delaware corporation doing business as Origin Materials ("Legacy Origin"). Pursuant to the terms of the Merger Agreement, we effected a business combination with Legacy Origin through the merger of Merger Sub with and into Legacy Origin, with Legacy Origin surviving as the surviving company and as our wholly-owned subsidiary. We refer to this as the "Merger" and, collectively with the other transactions described in the Merger Agreement, the "Business Combination". In connection with the closing of the Business Combination (such time is referred to herein as the "Effective Time"), we changed our name to Origin Materials, Inc.

Unless the context indicates otherwise, references in this Annual Report to the "Company," "Origin," "we," "us," "our" and similar terms refer to Origin Materials, Inc. (f/k/a Artius Acquisition Inc.) and its consolidated subsidiaries (including Legacy Origin). References to "Artius" refer to the predecessor company prior to the consummation of the Business Combination.

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

Origin Materials, Inc. (the "Company") makes forward-looking statements in this Annual Report (this "Annual Report") and in documents incorporated herein by reference. All statements, other than statements of present or historical fact included in or incorporated by reference in this Annual Report, regarding the Company's future financial performance, as well as the Company's strategy, future operations, financial position, estimated revenues, and losses, projected costs, prospects, plans and objectives of management are forward-looking statements. When used in this Annual Report, the words "anticipate," "believe," "continue," "could," "estimate," "expect," "intends," "may," "might," "plan," "possible," "potential," "predict," "project," "should," "will," "would" the negative of such terms and other similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain such identifying words. These forward-looking statements are based on management's current expectations, assumptions, hopes, beliefs, intentions and strategies regarding future events and are based on currently available information as to the outcome and timing of future events. The Company cautions you that these forward-looking statements are subject to all of the risks and uncertainties, most of which are difficult to predict and many of which are beyond the control of the Company, incident to its business.

These forward-looking statements are based on information available as of the date of this Annual Report, and current expectations, forecasts and assumptions, and involve a number of risks and uncertainties. Accordingly, forward-looking statements in this Annual Report and in any document incorporated herein by reference should not be relied upon as representing the Company's views as of any subsequent date, and the Company does not undertake any obligation to update forward-looking statements to reflect events or circumstances after the date they were made, whether as a result of new information, future events or otherwise, except as may be required under applicable securities laws.

As a result of a number of known and unknown risks and uncertainties, the Company's actual results or performance may be materially different from those expressed or implied by these forward-looking statements. Some factors that could cause actual results to differ include:

- the effectiveness of the Company's disclosure controls and procedures and internal control over financial reporting;
- the Company's future financial and business performance, including financial projections and business metrics;
- changes in the Company's strategy, future operations, financial position, estimated revenues and losses, projected costs, prospects and plans;
- the Company's ability to scale in a cost-effective manner;
- the Company's ability to raise capital, secure additional project financing and secure government incentives;
- the Company's ability to complete construction of its plants in the expected timeframe and in a cost-effective manner;
- the Company's ability to procure necessary capital equipment and to produce its products in large commercial quantities;
- the impact of government laws and regulations and liabilities thereunder, including any decline in the value of carbon credits;
- the Company's ability to procure and store necessary raw materials;
- any increases or fluctuations in raw material costs;
- the ability to maintain the listing of the Company's common stock on the Nasdaq; and
- the impact of worldwide economic, political, industry, and market conditions, including the continued effects of the global COVID-19 pandemic, sanctions imposed against Russia following its military intervention in Ukraine, global supply chain disruptions, increased inflationary pressure, labor market constraints, and other macroeconomic factors.

Other risks and uncertainties set forth in this Annual Report, including risk factors discussed in Item 1A under the heading, "Risk Factors".

RISK FACTOR SUMMARY

The following risk factors summary and other information included in this Annual Report should be carefully considered. The summary risks and uncertainties described below are not the only ones we face. Additional risks and uncertainties not currently known to us or that we currently deem less significant may also affect our business operations or financial results. If any of the following risks actually occur, our stock price, business, operating results and financial condition could be materially adversely affected. For more information, see item 1A titled “Risk Factors” for more detailed descriptions of each risk factor.

- We are an early stage company with a history of losses and our future profitability is uncertain, and our financial projections may differ materially from actual results.
- Our business plan assumes we can secure substantial additional project financing and government incentives, which may be unavailable on favorable terms, if at all.
- Construction of our plants may not be completed in the expected timeframe or in a cost-effective manner. Any delays in the construction of our plants could severely impact our business, financial condition, results of operations and prospects.
- We plan to rely initially on a limited number of plants as our primary sources of revenue and to meet customer demand in the near-term.
- We have not produced our products in large commercial quantities and may not manage growth effectively.
- Our offtake agreements with certain customers include liquidated damages, advance repayment and/or termination provisions that may be triggered if we fail to timely complete plant construction or commence our commercial operations.
- We plan to rely on a limited number of customers for a significant portion of our near-term revenue.
- Our industry is highly competitive, and we may lose market share to producers of products that can be substituted for our products, which may have an adverse effect on our results of operations and financial condition.
- Increases or fluctuations in the costs of our raw materials or other operating costs may affect our cost structure.
- Our suppliers may fail to deliver raw materials according to schedules, prices, quality and volumes that are acceptable to us, or we may be unable to manage these supplies effectively.
- We have entered and may enter in the future into collaborations, strategic alliances, and licensing arrangements that involve significant risks and may not produce the benefits we anticipate.
- Compliance with extensive environmental, health and safety laws could require material expenditures, changes in our operations or site remediation.
- Our business relies on proprietary information and other intellectual property, and our failure to protect our intellectual property rights could harm our competitive advantages with respect to the use, manufacturing, sale or other commercialization of our processes, technologies and products, which may have an adverse effect on our results of operations and financial condition.
- We may face patent infringement and other intellectual property claims that could be costly to defend, result in injunctions and significant damage awards or other costs (including indemnification of third parties or costly licensing arrangements, if licenses are available at all) and limit our ability to use certain key technologies in the future or require development of non-infringing products or technologies, which may cause us to incur significant unexpected costs, prevent us from commercializing our products and otherwise harm our business.
- We rely on trade secrets to protect our technology, and our failure to maintain trade secret protection could limit our ability to compete.
- We previously identified a material weakness in our internal control over financial reporting that we have concluded has been remediated, though we may identify additional material weaknesses in the future or fail to maintain effective internal control over financial reporting, which may result in material misstatements of our consolidated financial statements or result in failure to meet our periodic reporting obligations.
- Our management has limited experience in operating a public company.

Part I

Item 1. Business

Overview

Origin is a carbon negative materials company with a mission to enable the world's transition to sustainable materials by replacing petroleum-based materials with decarbonized materials in a wide range of end products, such as food and beverage packaging, clothing, textiles, plastics, car parts, carpeting, tires, adhesives, soil amendments and more. We believe that our platform technology can help make the world's transition to "net zero" possible and support the fulfillment of greenhouse gas reduction pledges made by countries as part of the United Nations Paris Agreement as well as corporations that are committed to reducing emissions in their supply chains.

Our technology can convert sustainable feedstocks such as sustainably harvested wood residues, agricultural waste, wood waste and even corrugated cardboard into materials and products that are currently made from fossil feedstocks such as petroleum and natural gas. These sustainable feedstocks are not used in food production, which differentiates our technology from other sustainable materials companies that use feedstocks such as vegetable oils or high fructose corn syrup and other sugars.

We believe that products made using Origin's platform technology can compete directly with petroleum-derived products on both performance and price. Due to abundant and renewable wood supplies that have historically stable pricing, our cost of production is expected to be more stable than potential competing platforms that use other types of feedstocks. We believe that end products made using our platform technology will have a significant unit cost advantage over products made from other low carbon feedstocks.

Our chemicals can be converted into both "drop-in" materials and new materials with differentiated functional performance. The "drop-in" products are chemically fungible with those produced from petroleum-based raw materials, and therefore these "drop-in" products can be fed into existing supply chains without modification to the equipment or production processes of our customers.

Origin's capability to produce carbon negative materials is protected by an intellectual property portfolio comprised of 23 patent families as well as trade secrets covering non-discoverable aspects of Origin's critical manufacturing processes.

We have developed strong partnerships with large, brand-name corporations determined to transition to sustainable materials to help meet their emissions reduction goals. For example, in 2017, we founded the "NaturALL Bottle Alliance" with Danone and Nestlé Waters, with PepsiCo joining in 2018, to accelerate the development of innovative packaging solutions made with 100% sustainable and renewable resources. Each member of the NaturALL Bottle Alliance has agreed to assist in establishing a supply chain for the production of the sustainable materials being developed by the NaturALL Bottle Alliance. Each member has also agreed to provide technical equipment, resources, know-how and scientific skills necessary for the performance of the NaturALL Bottle Alliance's research and development program, and to be responsible for its own expenses. The members' offtake agreements with us provide additional financial support for the research and development program and the commercialization of sustainable materials under development by the NaturALL Bottle Alliance. In addition to being customers, Danone, Nestlé and PepsiCo also invested in Origin. We have also significantly expanded our customer and partnership base over time to other industries, including relationships with Kolon Industries, Ford Motor Company, Mitsubishi Gas Chemical, PrimaLoft, Solvay, AECI, Stepan, Mitsui & Co., Packaging Matters, Minafin Group, LVMH Beauty, Mitsubishi Chemical Group, Kuraray, Revlon, ATC Plastics, Intertex, and others.

We also expect to accelerate the development of high-performance products through technology collaborations and joint development agreements with current and prospective customers. In these relationships, we expect to supply expertise and materials, including products we manufacture at our Origin 1 plant, and our customer partner provides funding and its own expertise. Together, we work to test and establish market demand, product formulations, and specifications that meet the customer's needs in anticipation of that customer's purchase of commercial volumes of the co-developed product.

Our vision for the future is the replacement of fossil-based feedstocks and materials with non-food, plant-based feedstocks and materials, while capturing carbon in the process. Our decarbonizing platform technology potentially addresses an estimated \$1.0 trillion dollar market opportunity, and we believe it can help revolutionize the production of a wide range of end products.

Our Platform Technology

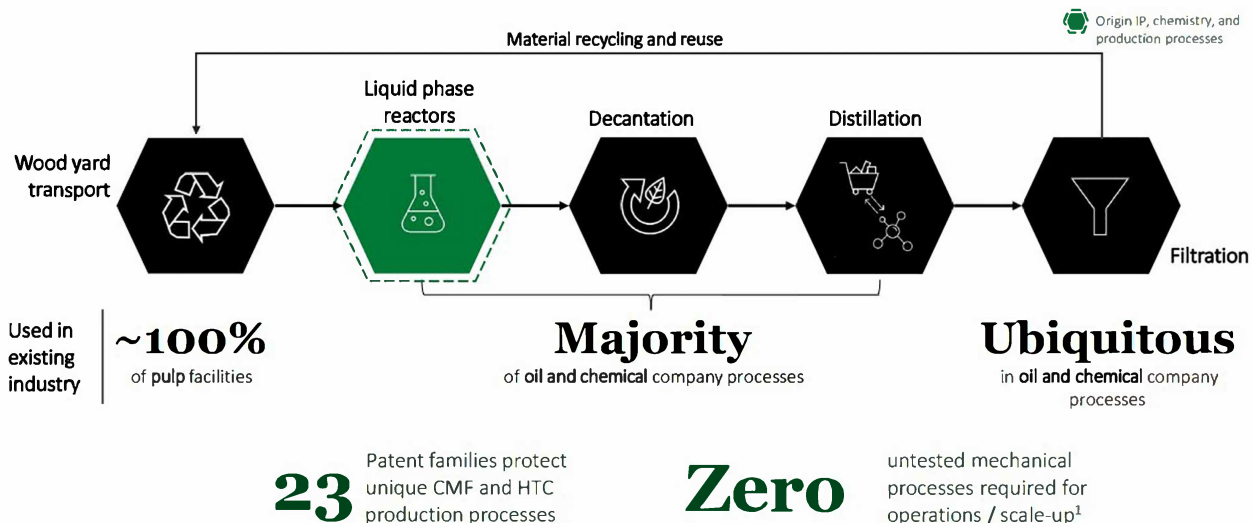
We have developed a proprietary platform technology to convert biomass, or plant-based carbon, into the versatile “building block” chemicals chloromethylfurfural (“CMF”) and hydrothermal carbon (“HTC”), which we collectively refer to as Furanic Intermediates, as well as other oils and extractives and other co-products. At commercial scale, our platform technology is expected to produce CMF and HTC with a negative carbon footprint. We believe these chemicals can replace petroleum-based inputs, lowering the carbon footprint of a wide range of materials without increasing cost or sacrificing performance.

CMF. CMF is a chemically flexible intermediate that can be converted into a variety of products, including paraxylene (“PX”), that can “drop in” to current supply chains to produce purified terephthalic acid (“PTA”), and subsequently polyethylene terephthalate (“PET”). Alternatively, CMF can be used to produce furandicarboxylic acid (“FDCA”), which can be converted into polyethylene furanoate (“PEF”). CMF and its derivatives can be used to produce numerous commodity and specialty chemicals. We have developed products made from CMF that can be used in applications such as food and beverage packaging and apparel and carpet fibers, and our product development pipeline includes applications such as adhesives, coatings and plasticizers.

HTC. HTC is a diverse, high-potential carbon-negative material. Current applications of our HTC include a drop-in, energy-dense solid fuel. HTC can also be calcined to produce a carbon-negative activated carbon for food and water treatment and filtration. Our HTC product development pipeline includes carbon black replacement for tires, foams and dyes, paint and coating applications, and agriculture and soil products. Notably, our carbon black has no detectable carcinogenic compounds, known as polyaromatic hydrocarbons, found in carbon black produced from fossil feedstocks.

Our manufacturing process to produce CMF and HTC consists of front end feedstock handling, and subsequent liquid phase reaction with our catalyst mixture, followed by downstream separation processes to separate and purify CMF, HTC and other co-products, as described in the following diagram.

Origin is delivering transformational chemistry through mature, industry-standard equipment, materials, and technical processes



1. Origin does not rely on any novel mechanical processes in its plants. All of Origin's mechanical processes are standard mechanical processes utilized in the chemicals and refining industry.

Oils and Extractives. An "oils and extractives" co-products stream is produced alongside our CMF and HTC. We have made progress toward development of new products and applications such as biofuels from this stream, which may be incorporated into the design of Origin 2 and future plants. We believe such cellulose-derived, low carbon intensity biofuels could potentially be used in transportation and marine fuel, industrial applications, and heat and power generation.

Market Opportunity

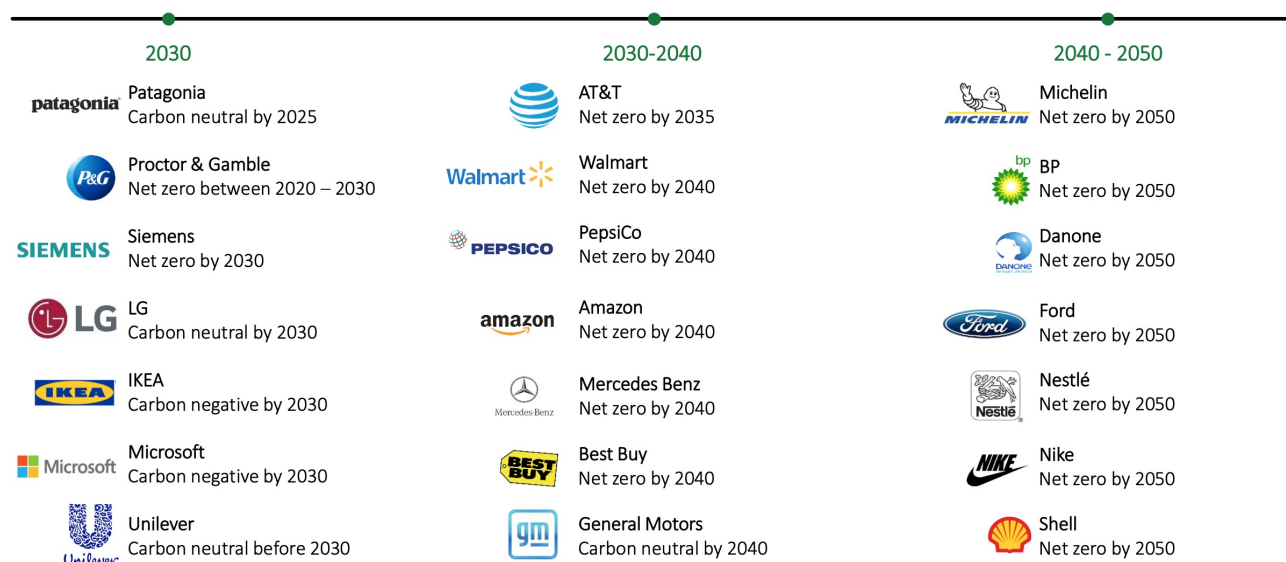
Global Decarbonization Commitments

We believe that increasing consumer awareness and growing governmental initiatives are driving a shift in the global community towards decarbonized materials. The UN Paris Agreement of 2015, joined by 194 countries and the European Union to date, includes commitments to limit the global average temperature increase by 2100 to well below 2°C compared to pre-industrial levels. To achieve this target, the UN estimated in 2019 that annual carbon dioxide (“CO₂”) emissions must be 15 gigatons lower than current nationally determined contributions imply.

According to a 2019 Ellen MacArthur Foundation study, approximately 45% of global CO₂ emissions are associated with manufacturing products, including the production of materials and chemicals from which those products are made. According to a 2019 Barclays estimate, the chemicals market consumes 10.6 million barrels of oil per day, releasing massive quantities of new carbon into the atmosphere in the process. Our vision for the future is to replace fossil-based feedstocks and materials with sustainably harvested wood and other non-food, sustainable feedstocks. As a tree grows, it consumes existing CO₂ from the atmosphere, and when it dies and decays, that CO₂ is released back into the atmosphere. However, through our proprietary manufacturing process, we convert the wood into manufacturing and feedstock materials, thereby capturing that CO₂.

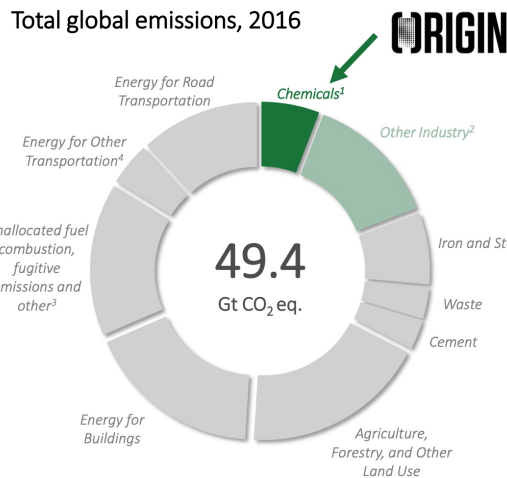
Many companies have already pledged to achieve net zero carbon targets, with some aiming to achieve that target within the next decade. Despite the progress in the shift to renewable energy generation and electric vehicles, we believe that reducing emissions from energy use alone is insufficient to achieve the goals and commitments established by companies and governments. Consequently, in the near-term, we believe that these companies will need to integrate decarbonized materials into their supply chains.

The graphic below highlights some of the notable companies that have made public commitments, either in the press or on their websites, to decarbonization and their respective decarbonization targets:



Our Addressable Market

According to the International Energy Agency, the chemical sector is the largest industrial consumer of both oil and gas. Currently, organic chemicals are predominantly derived from fossil sources such as petroleum. These chemicals are used to produce a wide array of materials from paints to plastics, space suits to solar panels, and from medicines to electronics. According to a 2019 Barclays estimate, more than 10 million barrels of oil are consumed daily to create these materials, releasing massive quantities of new carbon into the atmosphere in the process. According to a 2018 report by The Association of Plastic Recyclers, for example, every kilogram of virgin fossil-PET has a life cycle global warming potential of 2.78 kilograms of carbon emissions. Our platform technology will enable companies to lower their overall CO₂ emissions and meet their emissions reduction commitments by substituting decarbonizing Furanic Intermediates and their derivatives for all or a portion of the fossil-based content of materials like PET in their supply chains.



Source: Origin Materials estimates (2020), Climate Watch (2020), the World Resources Institute (2020), ourworldindata.org.

Our platform technology can produce carbon-negative and low carbon replacements for chemicals that have many potential applications. Our platform technology is expected to address some of these applications as soon as its initial production capacity is online, and to address other potential applications over time. Origin's near-term and long-term addressable markets together exceed \$1.0 trillion.

\$390+ billion near-term market focus. We believe our technology can serve near-term markets representing an aggregate market opportunity that we believe is over \$390 billion. These markets include polyesters for textiles, resin for packaging, solid fuels, activated carbon and carbon black for tires and polymer fillers. We expect the Origin plants projected to be built over the next decade to be able serve these markets.

\$750+ billion long-term market focus. Our platform technology produces versatile chemical “building blocks” that we anticipate, in the long term, can be converted into products to replace a broad range of chemicals and materials representing an addressable market that we believe is more than \$750 billion. These markets include paints, coatings, soil additives, advanced polyesters, epoxies, plasticizers, polyurethanes, elastomers, emulsions and solvents.

Competitive Landscape

We expect our products to compete with traditional, petroleum-based materials currently used in Origin's target markets, as well as compete with alternatives to these materials that both established and new companies seek to produce.

In our near-term markets, we expect to compete with global oil and petrochemical companies and large international diversified chemical companies. Several of these producers are seeking to develop materials from renewable sources that could compete with our products. Moreover, a number of established companies and new entrants have announced intentions to develop renewable alternatives for existing chemical products used in our near-term focus markets.

In addition to competition from producers of petroleum-based materials and renewable alternatives, we expect to face competition from recycled materials such as recycled PET (“rPET”) in certain applications in our near-term focus markets. We do not believe that recycled materials will achieve the required scale and penetration to impact the market demand for our products before 2030 because recycling streams are significantly supply-constrained. We believe that improving the supply constraint for recycling will require substantial investments in infrastructure and fundamental changes to the existing entrenched governmental and institutional recycling systems and customer behavior and habits. Additionally, unless there are major changes to current technology and infrastructure, we believe that it will be difficult to implement 100% rPET material sourcing for many applications.

In our long-term focus markets, we expect to face competition from, among others, incumbents that include large chemical companies that continue to rely on petroleum-based feedstocks in their production processes.

Given our leading position in decarbonized materials, we also expect to compete with alternative technologies targeting different sources of emissions. These competitors include electric vehicles, renewable power generation, and food technology. While we do not anticipate competing directly for market share with producers of these technologies, we expect to compete for wallet share from customers looking to reduce overall carbon emissions throughout their supply chain and operations. In the long-term, once adoption of various technologies has increased and customers no longer have to prioritize different methods of reducing overall carbon emission, we expect only to compete against other materials producers.

Our Competitive Strengths

We believe that our platform technology can replace petroleum as the foundational feedstock for the materials economy. Our competitive strengths include:

- ***Flexible platform enables drop-in solutions serving a large addressable market.*** We believe that our platform technology is well-positioned to address a substantial global market that is just beginning to transition from petroleum-based materials to sustainable materials. Many of our products are drop-in replacements for traditional petrochemicals, enabling our customers to use our products in their existing manufacturing processes to produce chemically and physically identical end products with little to no change in customer behavior.
- ***Abundant, low-cost and historically price-stable feedstock.*** Our platform technology can use timber and forest residues such as pine pulpwood, which is currently abundant and renewable, as its base-case feedstock. The feedstock for the pulp industry in North America is plentiful and the cost has historically been relatively low and stable compared with the cost of oil. The market for these wood-based feedstocks tends to be local due to relatively high transport costs, and therefore is insulated from typical commodity price volatility. Furthermore, our pulpwood feedstock does not compete for use as a food source, insulating our products from demand price pressures faced by other agricultural-based renewable feedstocks such as corn and sugarcane.
- ***Unit Economics.*** Our proprietary platform technology converts low-cost renewable feedstock into flexible chemical intermediates in a single catalytic reaction.
- ***Carbon Footprint.*** We believe our products can help enable prospective customers to achieve their net zero carbon emissions commitments by transitioning away from fossil-based materials towards materials made with our platform technology, which uses sustainable, non-food, plant-based feedstock. We estimate that a single 1 million dry metric ton per year input commercial scale Origin plant producing CMF and HTC can eliminate or avoid more than 1.3 million tons of emitted carbon annually.
- ***High Barriers to Entry.*** Over more than a decade, we have generated a robust patent portfolio as well as critical trade secrets. We believe our competitors now significantly lag behind us and will be unable to replicate the efficiency, yield and quality of our process, as we expect to continue to improve our existing technology and processes.

Business Strategy

Our goal is to build a commercially successful business that can scale and meet current and future expected demand for carbon negative materials. We plan to construct plants that can produce materials at a commercial scale and expect to continue to develop new products and applications, together with our platform partners, to maintain and increase its competitive advantage.

Key elements of our strategy include:

Start-up of Origin 1 and launch construction of Origin 2:

- We are undertaking two significant initial capital projects: “Origin 1” and “Origin 2”. Origin 1 is a strategic asset which we plan to use to qualify higher-value applications for our intermediates CMF and HTC. At scale, Origin 2 is intended to focus on supplying products that serve our near-term markets of interest.

- Origin 1, the Company's first commercial manufacturing plant, is mechanically complete, in-line with the previously disclosed timeline, with plant commissioning underway and the completion of plant commissioning and start-up expected in Q2 2023. We will use Origin 1 not just to scale our technology, but to produce samples in higher volumes than produced at our pilot facilities. We expect to gradually ramp up Origin 1 operations and, as we ramp, we will aim to optimally fulfill customer demand while we produce samples and qualify materials. We expect that Origin 1 revenue in this first year will be driven mostly by the pace at which the supply chain for this material can be activated and customer readiness to accept our materials.
- As of December 31, 2022, Origin 2 is in the project development stage. During 2022, we announced the completion of certain milestones, such as site selection of Geismar, Louisiana, owner's engineer selection and the approval by the Bond Commission of Louisiana and preliminary approval by the Louisiana Public Finance Authority, which could allow for the issuance of up to \$1.5 billion tax-exempt bonds for the financing of the construction of Origin 2. We continue to make progress on front-end design, construction planning, and financing. The overall site plot plan and logistics plan have been developed and we have made progress on developing new products and applications which may be incorporated into the design of the plant, such as FDCA, PEF, as well as biofuels from an "oils and extractives" stream co-produced alongside CMF and HTC.

Sell-out contracted capacity in future plants years ahead of mechanical completion:

- We believe that our platform technology ideally positions Origin to address industry demand for carbon-negative and low-carbon materials. As of February 23, 2023, we had announced approximately \$9.3 billion in contracted offtake agreements (including customer options, which may or may not be exercised) and capacity reservations. These agreements have terms ranging from 5-10 years and encompass production from one or more of Origin 1, Origin 2, Origin 3 and Origin 4. Our customers include Global Fortune 500 companies including Ford Motor Company and fellow NaturALL Bottle Alliance members Danone, Nestlé Waters, and PepsiCo, as well as Mitsubishi Gas Chemical, Kolon Industries, PrimaLoft, Solvay, Mitsui & Co., Ltd., Minafin Group, LVMH Beauty, Revlon, Mitsubishi Chemical Group, Kuraray, Intertex World Resources, ATC Plastics, and others. Because we believe that demand for our products from these and other existing and prospective customers will outpace supply for the foreseeable future, we expect that we will need to identify and prioritize sales to customers for applications that command the highest margins. Please see the section titled "Offtake Agreements" for additional information regarding our offtake agreements.

Expand and develop new partnerships across the value chain:

- Our strategy includes, among other things, engaging procurement and construction companies and enter into joint ventures for production, which would provide us with best-in-class capabilities to efficiently construct our plants. In addition, we expect to collaborate with partners who have the market knowledge and expertise to design compelling products and penetrate new markets. We believe that helping these partners build profitable new businesses and product lines using our cost-advantaged chemical intermediate platform enhances the value of our platform and promotes long-term committed customer relationships for an expanding and diversifying set of markets. We also intend to continue creating industry collaborations like the NaturALL Bottle Alliance and like our partner and customer relationships with Kolon Industries, Drive+, Alliance to End Plastic Waste, Ford Motor Company, Mitsubishi Gas Chemical, PrimaLoft, Solvay, and others, to commercialize decarbonizing solutions with the help of end users and brands. We intend to continue using demand from industry-leading brands to motivate and align the intermediate supply chain to meet carbon reduction commitments. We may also work with upstream partners to identify suitable aging or defunct pulp mills, convert key equipment components, and integrate those components into a refurbished and repurposed chemical plant. We expect this approach would enable us to partner with the existing forest products supply chains and government entities concerned with forest management and potential local labor and economic benefits associated with repurposing the pulp mills.

Continue development of next-gen materials and applications:

- Our strategy focuses on developing low and negative carbon materials for use in a variety of products, including textiles and fabrics, next generation packaging, paints, coatings, and epoxies, fillers for tires and other rubber products, fuels, and agricultural products.

- Our CMF product focus is on low or negative carbon polyesters. We intend to focus on improving polyesters with the incorporation of furanic content to make products such as “PETF” blended products, and we expect to focus on producing next generation high-performance polyesters with strong gas barrier and high heat resistance that can be fully recyclable with current technologies.
- Our HTC product focus is on energy-dense fuels. We intend to focus on developing carbon negative, carcinogen-free carbon black replacement for tires and other rubber and polymer filled materials. We also expect to focus on developing next generation agricultural products such as slow-release fertilizers as well as microbial and biologics delivery.

Develop new revenue streams through technology licensing:

- We have developed technologies to convert CMF and HTC into a variety of valuable end products, and expect to continue to develop these technologies. We expect, over time, to license this technology to relevant manufacturers of those end products while we supply the CMF and HTC to the licensees.

Our Products

The majority of our product output is comprised of versatile Furanic Intermediates. Depending on the specific feedstock, we may also produce several minority co-products, including levulinic acid, furfural, and and oils and extractives stream.

CMF—chloromethylfurfural:

- CMF is an organic compound derived directly from cellulosic biomass through our patented process, consisting of furan substituted at the 2 and 5 positions with a formyl group and chloromethyl group. CMF is easily derivatized into multiple products including those for polyesters, nylons, epoxies, surfactants, and several others. At full commercial scale, our process is expected to be able to produce CMF with a carbon impact of –1.21 kg CO₂ equivalent/kg CMF, according to a life cycle analysis by Deloitte SAS.

HTC—hydrothermal carbon:

- HTC is a carbonaceous composite consisting of furanic resin and lignin fragments. It is derived from ligno-cellulose through our patented process, and is a structured composite resin comprising furanic chemical groups that can be further functionalized or de-functionalized while retaining nano-scale morphology of the HTC. Via functionalization or de-functionalization, HTC may be further derivatized into products such as carbon black, activated carbon, as well as a variety of agricultural products. At full commercial scale, our process is expected to be able to produce HTC with a carbon impact of –1.67 kg CO₂ equivalent/kg HTC, according to a life cycle analysis by Deloitte SAS.

Oils and Extractives:

- An “oils and extractives” co-products stream is produced alongside our CMF and HTC. We have made progress toward development of new products and applications such as biofuels from this stream, which may be incorporated into the design of Origin 2 and future plants. We believe such cellulose-derived, low carbon intensity biofuels could potentially be used in transportation and marine fuel, industrial applications, and heat and power generation.

Raw Materials Supply

Our platform technology can produce building block chemicals from a variety of abundant, low-cost bio-feedstocks including wood residues and wood processing waste. Our process was designed to be able to take advantage of idled and aging pulp mills and may be co-located with such mills to secure access to existing site-specific feedstock supplies and skilled labor while lowering required capital investment. We believe we will be able to contract for the necessary quantity and quality of these or suitable alternative feedstocks needed to manufacture products. We expect our demand for wood residues and wood processing waste in 2030 represents less than 1% of the world’s total supply of these feedstocks and less than 0.5% of the global supply of suitable alternative feedstocks that can be used in our process, such as agricultural wastes, mixed paper waste, and construction wastes.

Offtake Agreements

From time to time, we enter into offtake agreements with customers, which generally provide for the purchase of specified volumes of product per year from one or more of our current and planned manufacturing facilities. To date, we have entered into eight offtake agreements with several counterparties, including certain current and Legacy Origin preferred stockholders such as Danone, Nestlé Waters, and Pepsi.

In November 2016, we entered into an offtake agreement with Nestlé Waters. The agreement has a 5-year term to purchase a specified amount of product per year from the Origin 1 facility.

In November 2016, we entered into an Offtake Agreement with Danone Asia Pte Ltd. ("Danone"). The agreement, which was amended in August 2022, comprises both an option for Danone to make a one-time purchase from Origin 1 and a separate agreement to purchase a specified annual amount of product from Origin 2 for an initial term of up to 10 years.

In connection with two of our offtake agreements, we received a \$5.0 million prepayment from each of Nestlé Waters and Danone. These prepayments initially were expected to be credited against the purchase of product under those offtake agreements. Each prepayment was secured by a promissory note to be repaid in cash in the event Origin either did not complete construction of a certain facility, was unable to deliver product within a certain timeframe, or product sales were insufficient to recover the advances. Over the term of its offtake agreement, Nestlé Waters would receive credits totaling \$7.5 million. If repaid in cash, each promissory note bears interest and an annual rate defined under the note or amendment thereto. In 2019, we agreed to amend the Danone promissory note to make repayment in three fixed cash installments rather than as a credit against the purchase of product. In 2022, we agreed to amend the promissory note to revise the dates of those three installments, making each payment approximately 75 days earlier.

In August 2018, we entered into an offtake agreement with Pepsi. The agreement has a 5-year term to purchase a specified amount of product per year from the Origin 1 facility, and an additional 5-year term to purchase a specified amount of product per year from Origin 2.

In December 2020, we entered into an offtake agreement with Packaging Matters, LLC (formerly known as Packaging Equity Holdings, LLC) ("Packaging Matters"). This agreement has a 10-year term and provides for the purchase of specified volumes of product per year from each of our first four plants, Origin 1 through Origin 4.

The counterparties to these offtake agreements generally have the right to terminate the agreement in certain specified circumstances. Such circumstances include, for example, that we (or a critical member of the supply chain for which there is no available substitute) are subject to bankruptcy or similar proceedings, fail to meet certain product quality or quantity requirements or mutually agreed sustainability principals, or experience an extended, unresolved force majeure event. Some counterparties, including Nestlé Waters, Danone, Pepsi, and Packaging Matters also may terminate the offtake agreement if certain milestones are not met including, for example, commercial operation of our Origin plants by a certain date, delivery of product by a certain date, or upon notice that it is reasonably likely we will not fulfill certain conditions precedent to start-up of our Origin plants by specified dates. Our offtake agreement with Nestlé Waters also contains an obligation to pay liquidated damages of up to \$0.2 million in the event the production and construction milestones are not achieved on pre-established timelines.

Research and Development

Our strategy depends upon both continued improvement of our platform technology and development of new chemical pathways, next-generation materials and product applications, and our research and development efforts are focused on supporting these two objectives. We operate an in-house laboratory and pilot-scale manufacturing facilities in West Sacramento, California and Sarnia, Ontario, Canada to conduct research and development work. Using its versatile platform technology, Origin has been developing commercialization pathways for higher-value applications for its intermediates CMF and HTC such as FDCA and carbon black, respectively. In addition, Origin is exploring product applications such as epoxies and resins, surfactants, bio-asphalt, fuel pellets, as well as biofuel and bio-solvents from an "oils and extractives" stream co-produced with CMF and HTC. In addition, we conduct joint research and development work with third parties including academic institutions, vendors, and other partners such as members of the NaturALL Bottle Alliance, carbon black co-development partners, cosmetics packaging partners, chemical manufacturers, textile manufacturers and suppliers, automotive companies, and partners focused on the development of advanced monomers and polymers such as FDCA and PEF.

Intellectual Property

Our patent portfolio is comprised of 18 patent families focused on the conversion of biomass to CMF and HTC. Origin intends to retain exclusive rights to commercially work its biomass to CMF and HTC pathways. We also rely on trade secrets, know-how and continuing technological innovation to develop and maintain our proprietary position.

Patents. As of January 23, 2023, we own 27 U.S. patents, 26 foreign patents, 3 pending U.S. non-provisional applications, and 9 pending international applications. Our issued U.S. patents have expiration dates ranging from 2031 to 2036 and our patent applications, if granted, are expected to expire between 2034 and 2037, absent any adjustments or extensions. The term of individual patents depends upon the legal term of the patents in countries in which they are obtained. In most countries, including the United States, the patent term is generally 20 years from the earliest date of filing a non-provisional patent application in the applicable country. In the United States, a patent's term may, in certain cases, be lengthened by patent term adjustment, which compensates a patentee for administrative delays by the United States Patent and Trademark Office in examining and granting a patent or may be shortened if a patent is terminally disclaimed over a commonly owned patent or a patent naming a common inventor and having an earlier expiration date.

Our core technology—biomass to CMF and HTC—is protected with patents, trade secrets, and know-how. We have 27 patents directed to CMF. One U.S. and one Korean composition of matter patent expiring in 2034 are directed to crystalline forms of CMF. Seventeen patents are directed to compositions of and methods for preparing CMF. These include three in the United States, two in Korea, two in Malaysia, and one each in Brazil, China, India, and Mexico, which expire in 2032, as well as three patents in the United States, one in Malaysia, one in Europe, and one in Brazil that expire in 2034. Eight patents are directed to methods and systems for purifying CMF. These include one patent in the United States and one in China, each expiring in 2033, and three patents in the United States and one each in Brazil, China, and South Korea that expire in 2034. We have six pending applications directed to crystalline CMF, compositions, and methods for preparing CMF. These include one in the United States that would expire in 2034, two in Malaysia that would expire in 2034, two in China that would expire in 2034, and one in Europe that would expire in 2034.

We also have eight patents directed to methods for preparing PX and terephthalic acid (PTA when purified). These include two patents in the United States and one each in China and Japan that expire in 2032, as well as three patents in the United States and one in Japan that expire in 2033.

We have five patents directed to dimethylfuran (“DMF”), a derivative of CMF, including three patents in the United States expiring in 2034 directed to methods of producing DMF and two patents in the United States expiring in 2035 directed to compositions of and methods for preparing DMF. We also have one pending patent application in Thailand expiring 2035 directed to DMF.

We have two pending patent applications directed to furandicarboxylate-polymer compositions, including PEF, and methods for producing such compositions. These include one pending application in China that would expire 2036 and one pending application in the United States that would expire in 2037.

In addition, we have four patents and one pending application directed to polyhydroxylalkanoate (“PHA”), a biodegradable plastic. These include one composition of matter patent in the United States and one in Malaysia, each expiring in 2031, that are directed to bacterial strains for producing PHA, as well as two patents in the United States, and one pending patent application in Malaysia expiring in 2033 directed to compositions and methods for converting PHA into PHA derivatives.

We have two patents and one pending application directed to other derivatives of CMF. These include two U.S. patents expiring in 2035 and 2036, respectively, directed to methods of preparing chemical derivatives from CMF, and one pending application directed to compositions for preparing CMF derivatives.

Finally, we have one pending patent application in the United States that would expire in 2036 and is directed to compositions and resins of activated carbon and methods for producing these.

Trade secrets. We maintain a secure digital vault of our trade secrets with heightened confidentiality protections. Access to this vault is limited to a select group and is granted on a need-to-know basis. Further, the information in the vault is left strategically incomplete and requires corroboration from referenced internal documents to ensure that the entirety of any trade secret is known only by someone who has access to each such document. Our employees are required to participate in invention assignment and non-disclosure protocols to further ensure the protection of our trade secrets.

Know-how. An important aspect of our intellectual property, in addition to our patent portfolio and trade-secrets, is the depth of understanding and proficiency we gained in the behavior of the Origin technology platform's chemical reactions, the handling of feedstocks, and the process-ability of feedstocks given certain conditions. This know-how into our process and materials is carefully captured in many ways, such as by being photographed, videoed, measured, quantified, summarized, compared, and otherwise described. Within this information set, we have identified many key insights without which we believe a would-be competitor could not successfully operate in our industry or replicate our results.

Regulatory

Regulation by government authorities in the United States, Canada and other countries is a significant factor in the production and sale of our products and our ongoing research and development activities. The chemicals and intermediates that we manufacture and use, including CMF and HTC, require (or as the products are further commercialized are anticipated to require) authorization or exemptions under the Toxic Substances Control Act (TSCA) administered by the U.S. Environmental Protection Agency (the EPA), the Canadian Environmental Protection Act (CEPA) administered by Health Canada and Environment and Climate Change Canada, and the European Union's regulation entitled the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). Our production processes are subject to regulations and permit requirements relating to air emissions, wastewater discharges, waste generation and disposal and other environmental matters. Additionally, some applications will involve food contact and will be regulated by the U.S. Food and Drug Administration (the FDA).

Chemical control regulations applicable to us, such as TSCA, CEPA or REACH, impose restrictions with respect to the permitted volumes of, or the sites at which, certain chemicals manufactured or used by us may be manufactured, imported, transported and/or released into the environment. For example, in the United States, the manufacture of CMF as a chemical intermediate currently is restricted to a quantity of 15,000 kilograms per year and the volume of a substance that may be used in some subsequent conversions of CMF is subject to import restrictions in Canada. In addition, manufacture or import into Canada of HTC is limited to a certain amount per year prior to submitting a New Substance Notification. Compliance with these regulations is complex and could require significant capital and/or operating expenses, and failure to comply with any of these regulations can have significant consequences. Our regulatory focus has been on seeking the removal or relaxation of certain restrictions to enable scaled up production. We have filed or will be filing notifications under TSCA and CEPA seeking to remove these restrictions, as necessary, and are working to identify alternatives that are not similarly restricted in the location where they are used.

Employees and Human Capital Resources

Intentional Culture and Leadership. At Origin, our values inform our decision making and how we act. We are deliberate, open, and transparent about our dedication to our core purpose; to enable the world's transition to sustainable materials as the leading carbon negative materials company. We have assembled an exceptional team of scientists, engineers, and business leaders to develop and execute our strategic plans.

Diversity, Equity & Inclusion. We believe that having a diverse workforce, equitable employment practices, and an inclusive workplace better positions us to respond to the unique needs of all our stakeholders. In 2020, we created the Origin Committee on Diversity and Inclusion. This committee is responsible for ensuring that Origin policies, procedures, and practices are conducive to creating and maintaining a diverse and inclusive environment that is valuable for all stakeholders. In late 2021, we hired a leading diversity, equity & inclusion ("DE&I") consulting firm, to help us map out our DE&I strategy and operationalize our DE&I goals. In 2022, Origin Materials began executing on a multiyear strategy that includes prioritizing the hiring of a diverse workforce, an annual "Inclusion Survey" to benchmark & track DE&I progress, DE&I in person and on-line training for all levels of the organization, and building internal expertise around DE&I issues. As an example of these efforts, Origin was recognized by BioTalent Canada as an inclusion, diversity, equity and accessibility ("IDEA") Employer recently. Additionally, there is nearly equal representation between men and women through Origin's DE&I hiring efforts, with a large proportion of women having a technical background.

Human Capital. We believe that our ability to attract, retain and motivate exceptional employees is vital to our long-term competitive advantage. As such, our compensation practices, including long-term equity incentive plans, are designed to drive sustainable performance and align employee incentives with shareholder values. As of December 31, 2022, we had approximately 155 employees located in the United States and 46 employees in Canada, all of whom were full-time employees. None of our employees is subject to a collective bargaining agreement and we believe we have a good relationship with our employees. As we have increased the size of our team we also have built out our Human Resources capability and expanded internal processes and capabilities for growth and compliance that we believe enable our employees to optimize their impact at Origin.

Supporting Our Employees through COVID-19. In response to the COVID-19 pandemic, we established and enforced comprehensive policies in the areas of Infectious Disease Control and COVID-19 Vaccinations. Our employees were required to be vaccinated against COVID-19 or received a vaccination exemption and adhered to strict COVID-19 protocols when on-site at our locations. Our vaccinated employees, when on-site at our locations, were also required to adhere to rigorous guidelines to prevent the spread of infectious diseases. These guidelines were designed to meet or exceed those set by local, state, and federal authorities that are applicable to our employees and sites. In addition, we established and expanded remote working arrangements and tools across our organization in an effort to reduce the threat of a COVID-19 outbreak. Our COVID-19 Task Force, composed of staff and management employees across all departments, regularly evaluated our policies and guidelines. As the level of disruption caused by COVID-19 has lessened recently, we have suspended these COVID-19 requirements subject to periodic review and possible reinstatement by our COVID-19 Task Force.

Corporate Information

Artius Acquisition Inc. ("Artius") incorporated in the Cayman Islands on January 24, 2020 and formed for the purpose of effecting a merger, share exchange, asset acquisition, share purchase, reorganization or similar business combination with one or more businesses. On June 25, 2021, Zero Carbon Merger Sub Inc., a wholly-owned subsidiary of Artius merged with and into Micromidas, Inc. a Delaware corporation (now known as Origin Materials Operating, Inc., "Legacy Origin"), with Legacy Origin surviving as a wholly-owned subsidiary of Artius (the "Business Combination"). In connection with the closing of the Business Combination, Artius changed its name to Origin Materials, Inc. Legacy Origin was incorporated in 2008 as a Delaware corporation. Our principal executive offices are located at 930 Riverside Parkway, Suite 10, West Sacramento, California 95605. Origin has the following wholly-owned subsidiaries:

- Origin US Megasite Holding, LLC;
- Origin US Megasite 1, LLC;
- Origin US Megasite Development, LLC;
- Origin US Megasite Operating, LLC;
- Origin Materials Canada Holding Limited;
- Origin Materials Canada Pioneer Limited;
- Origin Materials Canada Polyesters Limited; and
- Origin Materials Canada Research Limited.

Additional Information

Origin's annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and all amendments to those reports are available free of charge on the Company's website at <https://investors.originmaterials.com> as soon as reasonably practicable after such material is electronically filed with, or furnished to, the Securities and Exchange Commission.

Item 1A. Risk Factors

The following risk factors apply to our business and operations. These risk factors are not exhaustive, and investors are encouraged to perform their own investigation with respect to our business, financial condition and prospects. We may face additional risks and uncertainties that are not presently known to us, or that we currently deem immaterial, which may also impair our business. The following discussion should be read in conjunction with the financial statements and notes to such financial statements included elsewhere in this Annual Report and the “Management’s Discussion and Analysis of Financial Condition and Results of Operations” section of this Annual Report.

Risks Related to Our Business

We are an early stage company with a history of losses and our future profitability is uncertain.

We have had a history of net losses due to our primary focus on research and development, plant construction, capital expenditures and early-stage commercial activities. Since our inception, we have not generated any revenue from product sales and have incurred significant net losses. Substantially all of our net losses since inception have resulted from our plant construction, research and development, and general and administrative costs associated with our operations. For the years ended December 31, 2021 and 2020, we had an accumulated deficit of \$56.8 million and \$98.9 million, respectively. For the year ended December 31, 2022, we had net income of \$78.6 million.

We expect that our net losses from operations will continue for the foreseeable future. Based on our estimates and projections, which are subject to significant risks and uncertainties, even if we are able to commercialize our products and generate revenue from product sales, we may not become profitable for many years, if at all.

Our potential profitability is dependent upon many factors, including our ability to complete construction of current and future plants, maintain an adequate supply chain, anticipate and react to demand for our products, manufacture our products on a commercial scale, secure additional customer commitments, and otherwise execute our growth plan. We expect the rate at which we will incur losses to be significantly higher in future periods as we:

- expand our commercial production capabilities and incur construction costs associated with building our plants;
- increase our expenditures associated with our supply chain, including sourcing primary feedstock for our products;
- increase our spending on research and development for new products;
- begin full scale commercial production of our products;
- increase our sales and marketing activities and develop our distribution infrastructure; and
- increase our general and administrative functions to support our growing operations and to operate as a public company.

Because we will incur the costs and expenses from these efforts before receiving meaningful revenue, our losses in future periods could be significant. We may find that these efforts are more expensive than we currently estimate or that these efforts may not result in revenues, which would further increase our losses.

We may not manage growth effectively.

Our failure to manage growth effectively could harm our business, results of operations and financial condition. We anticipate that a period of significant expansion will be required to address potential growth. This expansion will place a significant strain on our management, operational and financial resources. To manage the growth of our operations and personnel, we must establish appropriate and scalable operational and financial systems, procedures and controls and establish and maintain a qualified finance, administrative and operations staff. We may be unable to hire, train, retain and manage the necessary personnel or to identify, manage and exploit potential strategic relationships and market opportunities.

Our business plan assumes we can secure substantial additional project financing and government incentives, which may be unavailable on favorable terms, if at all.

We will need substantial additional project financing and government incentives in order to execute our growth strategy and expand our manufacturing capability. We have not yet secured such project financing and government incentives, and they may not be available on commercially reasonable terms, if at all. In particular, our ability to obtain financing for the construction of future plants may depend in part on our ability to first enter into customer agreements sufficient to demonstrate sufficient demand to justify the construction of such plants. If we are unable to obtain such financing and government incentives, or secure sufficient customer agreements, on commercially reasonable terms, or at all, we will not be able to execute our growth strategy.

To the extent that we raise additional capital in through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of those securities may include liquidation or other preferences that adversely affect your rights as a common stockholder. Debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making acquisitions or capital expenditures or declaring dividends. Debt financing could also have significant negative consequences for our business, results of operations and financial condition, including, among others, increasing our vulnerability to adverse economic and industry conditions, limiting our ability to obtain additional financing, requiring the dedication of a substantial portion of our cash flow from operations to service our indebtedness, thereby reducing the amount of our cash flow available for other purposes, limiting our flexibility in planning for, or reacting to, changes in our business, and placing us at a possible competitive disadvantage compared to less leveraged competitors or competitors that may have better access to capital resources.

If we raise additional funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or products, or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings or other arrangements when needed, we may be required to delay, limit, reduce or terminate our commercialization, research and development efforts or grant rights to third parties to market and/or develop products that we would otherwise prefer to market and develop ourselves.

If we seek government grants, incentives or subsidies, their terms may be limiting or restrict certain of our planned operations, thereby requiring us to alter our operating plans and materially impacting our financial projections and projected results of operations. Government grants may also be terminated, modified or recovered under certain conditions without our consent.

Changes in tax laws or tax rulings could materially affect our financial position, results of operations, and cash flows.

The tax regimes we are subject to or operate under, including income and non-income taxes, are unsettled and may be subject to significant change. Changes in tax laws, regulations, or rulings, or changes in interpretations of existing laws and regulations, could materially affect our financial position and results of operations. For example, the 2017 Tax Cuts and Jobs Act (the “Tax Act”) made broad and complex changes to the U.S. tax code. Future guidance from the IRS with respect to the Tax Act may affect us, and certain aspects of the Tax Act could be repealed or modified in future legislation. The Coronavirus Aid, Relief, and Economic Security Act (the “CARES Act”) has already modified certain provisions of the Tax Act. More recently, the Inflation Reduction Act of 2022 (the “IRA”) includes provisions that will impact the U.S. federal income taxation of corporations, including imposing a minimum tax on the book income of certain large corporations and an excise tax on certain corporate stock repurchases that would be imposed on the corporation repurchasing such stock. In addition, it is uncertain if and to what extent various states will conform to the Tax Act, the CARES Act, the IRA, or any newly enacted federal tax legislation. The issuance of additional regulatory or accounting guidance related to the Tax Act could materially affect our tax obligations and effective tax rate in the period issued. In addition, many countries in Europe and a number of other countries and organizations, have recently proposed or recommended changes to existing tax laws or have enacted new laws that could significantly increase our tax obligations in the countries where we do business or require it to change the manner in which we operate our business.

The Organization for Economic Cooperation and Development has been working on a Base Erosion and Profit Shifting Project, and issued a report in 2015, an interim report in 2018, and is expected to continue to issue guidelines and proposals that may change various aspects of the existing framework under which our tax obligations are determined in many of the countries in which we do business. Similarly, the European Commission and several countries have issued proposals that would change various aspects of the current tax framework under which we are taxed. These proposals include changes to the existing framework to calculate income tax, as well as proposals to change or impose new types of non-income taxes, including taxes based on a percentage of revenue. For example, several countries have proposed or enacted taxes applicable to digital services, which could apply to our business.

As we expand the scale of our international business activities, these types of changes to the taxation of our activities could increase our worldwide effective tax rate, increase the amount of taxes imposed on our business, and harm our financial position. Such changes may also apply retroactively to our historical operations and result in taxes greater than the amounts estimated and recorded in our financial statements.

Unanticipated changes in effective tax rates or adverse outcomes resulting from examination of our income or other tax returns could adversely affect our operating results and financial condition.

We are subject to taxation in Canada and United States with increasingly complex tax laws, the application of which can be uncertain. The amount of taxes we pay in these jurisdictions could increase substantially as a result of changes in the applicable tax principles, including increased tax rates, new tax laws or revised interpretations of existing tax laws and precedents, which could have an adverse impact on our liquidity and results of operations. In addition, the authorities in several jurisdictions could review our tax returns and impose additional tax, interest and penalties, which could have an impact on us and on our results of operations. We have previously participated in government programs with the Canadian federal government and Canadian provincial governments that provide investment tax credits based upon qualifying research and development expenditures. If Canadian taxation authorities successfully challenge such expenses or the correctness of such income tax credits claimed, our historical operating results could be adversely affected. As a public company, we will no longer be eligible for refundable tax credits under the Canadian federal Scientific Research and Experimental Development Program (“SR&ED”) credits. However, we are still eligible for non-refundable SR&ED credits under this program, which are eligible to reduce future income taxes payable.

Our future effective tax rates could be subject to volatility or adversely affected by a number of factors.

Our future effective tax rates could be subject to volatility or adversely affected by a number of factors, including:

- changes in the valuation of our deferred tax assets and liabilities;
- expected timing and amount of the release of any tax valuation allowances;
- tax effects of stock-based compensation;
- costs related to intercompany restructurings;
- changes in tax laws, regulations or interpretations thereof; or
- future earnings being lower than anticipated in countries where we have has lower statutory tax rates and higher than anticipated earnings in countries where we have has higher statutory tax rates.

We may conduct activities in other jurisdictions through our subsidiaries pursuant to transfer pricing arrangements and may in the future conduct operations in other jurisdictions pursuant to similar arrangements. If two or more affiliated companies are located in different countries, the tax laws or regulations of each country generally will require that transfer prices be the same as those between unrelated companies dealing at arms’ length. While we intend to operate in compliance with applicable transfer pricing laws, our transfer pricing procedures are not binding on applicable tax authorities. If tax authorities in any of these countries were to successfully challenge our transfer prices as not reflecting arm’s length transactions, they could require us to adjust our transfer prices and thereby reallocate our income to reflect these revised transfer prices, which could result in a higher tax liability to us.

Our ability to use net operating loss carryforwards and other tax attributes may be limited in connection with the Business Combination or other ownership changes.

We have incurred losses during our history. To the extent that we continue to generate taxable losses, unused losses will carry forward to offset future taxable income, if any, until such unused losses expire, if at all.

Under the Tax Act, as modified by the CARES Act, U.S. federal NOL carryforwards generated in taxable periods beginning after December 31, 2017, may be carried forward indefinitely, but the deductibility of such net operating loss carryforwards in taxable years beginning after December 31, 2020, is limited to 80% of taxable income. In addition, our NOL carryforwards are subject to review and possible adjustment by the IRS, and state tax authorities. Under Sections 382 and 383 of the Code, our federal net operating loss carryforwards and other tax attributes may become subject to an annual limitation in the event of certain cumulative changes in the ownership of our stock. An “ownership change” pursuant to Section 382 of the Code generally occurs if one or more stockholders or groups of stockholders who own at least 5% of a company’s stock increase their ownership (as measured by value) by more than 50 percentage points over their lowest ownership percentage within a rolling three-year period. Our ability to utilize our NOL carryforwards and other tax attributes to offset future taxable income or tax liabilities may be limited as a result of ownership changes, including potential changes in connection with the Business Combination or other transactions. Similar rules may apply under state tax laws. We have recorded a valuation allowance related to our NOL carryforwards and other deferred tax assets due to the uncertainty of the ultimate realization of the future benefits of those assets.

Our outstanding secured and unsecured indebtedness, ability to incur additional debt and the provisions in the agreements governing our current debt, and certain other agreements, could harm our business, financial condition, results of operations and prospects.

Our debt service and similar obligations could have important consequences to us for the foreseeable future, including that our ability to obtain additional financing for capital expenditures, working capital or other general corporate purposes may be impaired and we may be or become substantially more leveraged than some of our competitors, which could place us at a relative competitive disadvantage and make us more vulnerable to changes in market conditions and governmental regulations.

We are required to maintain compliance with non-financial and other covenants under our debt and similar agreements. There are and will be operating or financial restrictions and covenants in certain of our debt and similar agreements, as well as certain other agreements to which we are or may become a party. These limit, among other things, our ability to incur certain additional debt, create certain liens or other encumbrances and sell assets. These covenants could limit our ability to engage in activities that may be in our best long-term interests. Our failure to comply with certain covenants in these agreements could result in an event of default under the various debt and similar agreements, allowing lenders to accelerate the maturity for the debt under these agreements and to foreclose upon any collateral securing the debt. Under such circumstances, we might not have sufficient funds or other resources to satisfy all of our obligations.

Risks Related to Our Operations and Industry

Construction of our plants may not be completed in the expected timeframe or in a cost-effective manner. Any delays in the construction of our plants could severely impact our business, financial condition, results of operations and prospects.

Our projected financial performance and results of operations, including our ability to achieve commercial scale production, depend on our ability to construct several commercial scale plants. In particular, except for Origin 2, subject to finalization of economic incentives, we have not selected a site for any of our future planned plants, and may have difficulty finding a site with appropriate infrastructure and access to raw materials. With respect to these future plants, we also do not have agreements with engineering, procurement or construction firms. Consequently, we cannot predict on what terms such firms may agree to design and construct our future plants. If we are unable to construct these plants within the planned timeframes, in a cost-effective manner or at all due to a variety of factors, including, but not limited to, a failure to acquire or lease land on which to build our plants, a stoppage of construction as a result of the COVID-19 pandemic, disruptions caused by the recent global sanctions imposed against Russia following its military intervention in Ukraine, unexpected construction problems, permitting and other regulatory issues, severe weather, inflationary pressures, labor disputes, and issues with subcontractors or vendors, including payment disputes, which we have previously experienced, our business, financial condition, results of operations and prospects could be severely impacted.

The construction and commission of any new project is dependent on a number of contingencies some of which are beyond our control. There is a risk that significant unanticipated costs or delays could arise due to, among other things, errors or omissions, unanticipated or concealed project site conditions, including subsurface conditions and changes to such conditions, unforeseen technical issues or increases in plant and equipment costs, insufficiency of water supply and other utility infrastructure, or inadequate contractual arrangements. Should these or other significant unanticipated costs arise, this could have a material adverse impact on our business, financial performance and operations. No assurance can be given that construction will be completed on time or at all, or as to whether we will have sufficient funds available to complete construction.

We plan to rely on a limited number of plants as our primary sources of revenue and to meet customer demand.

Our operating plan assumes that we will rely on a limited number of plants to meet customer demand and that these plants will supply most of our products until additional world-scale plants come online. Adverse changes or developments affecting these facilities could impair our ability to produce our products. Any shutdown or period of reduced production at these facilities, which may be caused by regulatory noncompliance or other issues, as well as other factors beyond our control, such as severe weather conditions, natural disaster, fire, power interruption, work stoppage, disease outbreaks or pandemics (such as COVID-19), equipment failure or delay in supply delivery, would, among other things, significantly disrupt our ability to generate revenue, execute our expansion plans, and meet our contractual obligations and customer demand. In addition, our plant equipment may be costly to replace or repair, and our equipment supply chains may be disrupted in connection with pandemics (such as COVID-19), trade wars and sanctions (such as those recently imposed against Russia), or other factors. If any material amount of our equipment is damaged, we could be unable to predict when, if at all, we could replace or repair such equipment or find suitable alternative equipment, which could adversely affect our business, financial condition, results of operations and prospects. Performance guarantees may not be sufficient to cover damages or losses, or the guarantors under such guarantees may not have the ability to pay. Any insurance coverage we have may not be sufficient to cover all of our potential losses and may not continue to be available to us on acceptable terms, or at all.

We may be delayed in procuring or unable to procure necessary capital equipment.

While the equipment we use to produce our products is currently widely available, we rely on outside companies to continue to manufacture the equipment necessary to produce our products. If our suppliers of capital equipment are unable or unwilling to provide us with necessary capital equipment to manufacture our products or if we experience significant delays in obtaining the necessary manufacturing equipment, our business, results of operations and financial condition could be adversely affected. In addition, the construction of our plants may require a substantial portion of certain materials and supplies relative to the overall global supply of such materials and supplies. If we are unable to secure an adequate supply of such materials and supplies on commercially reasonable terms, or at all, the construction of our plants may be delayed or terminated.

We have not produced our products in large commercial quantities.

We have no experience in producing large quantities of our products. While we have succeeded in producing small amounts of our products in our pilot plant for customer trials and testing purposes, we have not yet commenced large-scale production. There are significant technological and logistical challenges associated with producing, marketing, selling and distributing products in the specialty chemicals industry, including our products, and we may not be able to resolve all of the difficulties that may arise in a timely or cost-effective manner, or at all. While we believe that we understand the engineering and process characteristics necessary to successfully build and operate our additional planned facilities and to scale up to larger facilities, we may not be able to cost effectively manage production at a scale or quality consistent with customer demand in a timely or economical manner.

Any decline in the value of carbon credits associated with our products could harm our results of operations, cash flow and financial condition.

The value of our products may be dependent on the value of carbon credits, programs relating to low-carbon materials and products standards and other similar regulatory regimes or the implicit value of decarbonized materials. The value of these credits fluctuates based on market and regulatory forces outside of our control. There is a risk that the supply of low-carbon alternative materials and products outstrips demand, resulting in the value of carbon credits declining. Any such declines could mean that the economic benefits from our customers' efforts to decarbonize their operations might not be realized. Any decline in the value of carbon credits associated with our products could harm our results of operations, cash flow and financial condition.

We expect to rely on a limited number of customers for a significant portion of our near-term revenue.

We currently have offtake and capacity reservation agreements with a limited number of customers, from which we expect to generate most of our revenues in the near future. The loss of one or more of our significant customers, a substantial reduction in their orders, their failure to exercise customer options to enter into new offtake agreements or purchase product, their unwillingness to extend contractual deadlines if we are unable to meet production requirements, their inability to perform under their contracts or a significant deterioration in their financial condition could harm our business, results of operations and financial condition. If we fail to perform under the terms of these agreements, the customers could seek to terminate these agreements and/or pursue damages against us, including liquidated damages in certain instances, which could harm our business.

Our offtake agreements with certain customers include termination, liquidated damages and/or advance repayment provisions that may be triggered if we fail to timely complete plant construction or commence our commercial operations.

Our offtake agreements with certain customers allow those customers to terminate the agreements if specified construction and product delivery requirements are not satisfied. For example, under one of these agreements, if Origin 1 had not commenced commercial operation by December 31, 2021 or we had not delivered specified product volume from Origin 1 by September 30, 2022, then we could be required to pay liquidated damages up to an aggregate of \$0.2 million. The customer may also terminate the agreement and any outstanding secured promissory note resulting from an advance payment made to us by that customer will become due immediately. These milestones have been deferred to 2023 in order to facilitate the negotiation of an amendment to the agreement, including the milestone achievement dates. As of the date hereof, the negotiation is ongoing. The outstanding obligations under that promissory note, together with accrued interest, totaled an aggregate of \$5.4 million and \$5.2 million as of December 31, 2022 and December 31, 2021, respectively. Our offtake agreement with a second customer is terminable by that customer if commercial operation or delivery of product from Origin 1 has not occurred by March 31, 2023. In order to facilitate the negotiation of an amendment, this milestone has been deferred to March 2023.

Our offtake agreement with a third customer previously required us to pay liquidated damages if Origin 1 had not commenced commercial operation by June 30, 2022. On August 1, 2022, both parties mutually agreed to amend the offtake agreement to eliminate the liquidated damages provisions and milestone dates, among other things (see Item 9B - Other Information). No liquidated damages were demanded or paid under the original offtake agreement including for the period between June 30, 2022 and August 1, 2022.

Discussions to amend the first two agreements are ongoing but we cannot guarantee that the discussions will result in an extension or removal of the milestone dates and/or liquidated damages, as applicable. Accordingly, if these milestone dates are not extended or removed, we may be required to pay liquidated damages and repay the amounts outstanding under the foregoing promissory note and our offtake agreements may be subject to termination by our customers. If any of our offtake agreements are terminated or if we are required to pay liquidated damages or repay advances made under our offtake agreements, our business, results of operations and financial condition may be harmed.

Our products may not achieve market success.

We currently have a relatively small number of binding customer commitments for commercial quantities of our products. Some prospective customers are currently evaluating and testing our products prior to making large-scale purchase decisions. Other products we expect to develop have not yet started customer evaluation and testing. The successful commercialization of our products is dependent on our customers' ability to commercialize the end-products that utilize our products, which may gain market acceptance slowly, if at all. Furthermore, the technology for our products is new, and the economic performance and ultimate carbon footprint of these products is uncertain. The market for carbon-negative products is nascent and subject to significant risks and uncertainties.

Market acceptance of our products will depend on numerous factors, many of which are outside of our control, including, among others:

- public acceptance of such products;
- our ability to produce products of consistent quality that offer functionality comparable or superior to existing or new products;
- our ability to produce products fit for their intended purpose;
- our ability to produce new products or customizations of existing products to match changes in public demand;
- our ability to obtain necessary regulatory approvals for our products;
- the speed at which potential customers qualify our products for use in their products;
- the pricing of our products compared to competitive and alternative products, including petroleum-based plastics;
- the strategic reaction of companies that market competitive products;
- our reliance on third parties who support or control distribution channels; and
- general market conditions, including fluctuating demand for our products.

Our industry is highly competitive, and we may lose market share to producers of products that can be substituted for our products, which may have an adverse effect on our results of operations and financial condition.

The specialty chemicals industry is highly competitive, and we face significant competition from both large established producers of fossil-based materials, recycled fossil-based materials and a variety of current and future producers of low-carbon, biodegradable, or renewable resource-based materials. Many of our current competitors have longer operating histories, greater name recognition, larger customer bases and significantly greater financial, sales and marketing, manufacturing, distribution, technical and other resources than us. Our competitors may be able to adapt more quickly to new or emerging technologies, changes in customer requirements and changes in laws and regulations. In addition, current and potential competitors have established or may establish financial or strategic relationships among themselves or with existing or potential customers or other third parties. Accordingly, new competitors or alliances among competitors could emerge and rapidly acquire significant market share.

Our competitors may also improve their relative competitive position by successfully introducing new products or products that can be substituted for our products, improving their manufacturing processes, or expanding their capacity or manufacturing capabilities. Further, if our competitors are able to compete at advantageous cost positions, this could make it increasingly difficult for us to compete in markets for less-differentiated applications. If we are unable to keep pace with our competitors' product and manufacturing process innovations or cost position, it could harm our results of operations, financial condition and cash flows.

Our commercial success may be influenced by the price of petroleum relative to the price of non-fossil feedstocks.

Our commercial success may be influenced by the cost of our products relative to petroleum-based products. The cost of petroleum-based products is in part based on the price of petroleum, which is subject to historically fluctuating prices. Our production plans assume the use of timber and forest residues as feedstock, which historically have experienced low volatility relative to petroleum. If the price of bio-based feedstocks increases and/or the price of petroleum decreases, our products may be less competitive relative to petroleum-based products. A material decrease in the cost of conventional petroleum-based products may require a reduction in the prices of our products for them to remain attractive in the marketplace and may negatively impact our revenues.

Increases or fluctuations in the costs of our raw materials may affect our cost structure.

The price of raw materials may be impacted by external factors, including uncertainties associated with war, terrorist attacks, weather and natural disasters, health epidemics or pandemics (such as COVID-19), civil unrest, the effects of climate change or political instability, plant or production disruptions, strikes or other labor unrest, inflationary pressures, breakdown or degradation of transportation infrastructure used in the delivery of raw materials or changes in laws or regulations in any of the countries in which we have significant suppliers.

We currently use and plan to use local timber and forest residues as our primary raw materials. The cost of these raw materials is generally influenced by supply and demand factors, and our operating plans include assumptions that the timber and forest residues we intend to use as feedstock will be available at prices similar to historic levels with low volatility. As we continue to expand our production, we will increase our demand for timber and forest residues which may alter the anticipated stability in the costs of our raw materials and potentially drive an increase in the cost of such raw materials.

Our results of operations will be directly affected by the cost of raw materials. The cost of raw materials comprises a significant amount of our total cost of goods sold and, as a result, movements in the cost of raw materials, and in the cost of other inputs, will impact our profitability. Because a significant portion of our cost of goods sold is represented by these raw materials, our gross profit margins could be adversely affected by changes in the cost of these raw materials if we are unable to pass the increases on to our customers.

If our raw material prices experience volatility, there can be no assurance that we can continue to recover raw material costs or retain customers in the future. As a result of our pricing actions, customers may become more likely to consider competitors' products, some of which may be available at a lower cost. Significant loss of customers could adversely impact our results of operations, financial condition and cash flows.

Our suppliers may fail to deliver components according to schedules, prices, quality and volumes that are acceptable to us, or we may be unable to manage these supplies effectively.

Our manufacturing processes use local timber and forest residues as our primary raw materials. However, we may be unable to secure agreements with local suppliers for the necessary amount of raw materials in certain circumstances. Additionally, if our suppliers do not accurately forecast and effectively allocate sufficient materials to us or if they are not willing to allocate sufficient supplies to us, it may reduce our access to raw materials needed for our manufacturing and require us to search for new suppliers. The unavailability of any raw materials could result in production delays, idle manufacturing facilities, product design changes and loss of access to important residues supporting our production, as well as impact our capacity to fulfill our obligations under our offtake agreements. In addition, unexpected changes in business conditions, materials pricing, labor issues, wars, trade policies, natural disasters, health epidemics such as the global COVID-19 pandemic, trade and shipping disruptions, and other factors beyond our or our suppliers' control could also affect these suppliers' ability to deliver components to us or to remain solvent and operational.

Additionally, we may be unsuccessful in our continuous efforts to negotiate with existing suppliers to obtain cost reductions and avoid unfavorable changes to terms, or source less expensive suppliers for certain materials, especially in light of the overall increases in supply and shipment pricing. Any of these occurrences may harm our business, prospects, financial condition and operating results.

If we are required to obtain alternate sources for raw materials because a supplier is unwilling or unable to execute or perform under raw material supply agreements, if a supplier terminates its agreements with us, if a supplier is unable to meet increased demand as our commercial scale production expands, if we are unable to renew its contracts or if we are unable to obtain new long-term supply agreements to meet changing demand, we may not be able to obtain these raw materials in sufficient quantities, on economic terms, or in a timely manner, and we may not be able to enter into long-term supply agreements on terms as favorable to us, if at all. A lack of availability of raw materials could limit our production capabilities and prevent us from fulfilling customer orders, and therefore harm our results of operations and financial condition.

As the of our manufacturing increases, we will also need to accurately forecast, purchase, warehouse and transport raw materials at high volumes to our manufacturing facilities internationally. If we are unable to accurately match the timing and quantities of raw material purchases to our actual needs or successfully implement inventory management and warehousing systems, we may incur unexpected production disruption, storage, transportation and write-off costs, which may harm our business and operating results.

Maintenance, expansion and refurbishment of our facilities, the construction of new facilities and the development and implementation of new manufacturing processes involve significant risks.

Our facilities may require regular or periodic maintenance, upgrading, expansion, refurbishment or improvement. Any unexpected operational or mechanical failure, including failure associated with breakdowns and forced outages, could reduce our facilities' production capacity below expected levels, which would reduce our production capabilities and ultimately our revenues. Unanticipated capital expenditures associated with maintaining, upgrading, expanding, repairing, refurbishing, or improving our facilities may also reduce our profitability. Our facilities may also be subject to unanticipated damage as a result of natural disasters, terrorist attacks or other events.

If we make any major modifications to our facilities, such modifications likely would result in substantial additional capital expenditures and could prolong the time necessary to bring the facility online. We may also choose to refurbish or upgrade our facilities based on our assessment that such activity will provide adequate financial returns. However, such activities require time for development and capital expenditures before commencement of commercial operations, and key assumptions underpinning a decision to make such an investment may prove incorrect, including assumptions regarding construction costs and timing, which could harm our business, financial condition, results of operations and cash flows.

The construction of new manufacturing facilities entails a number of risks and assumptions, including the ability to begin production within the cost and timeframe estimated and to attract a sufficient number of skilled workers to meet the needs of the new facility. Additionally, our assessment of the projected benefits associated with the construction of new manufacturing facilities is subject to a number of estimates and assumptions, which in turn are subject to significant economic, competitive and other uncertainties that are beyond our control. If we experience delays or increased costs, our estimates and assumptions are incorrect, or other unforeseen events occur, our business, ability to supply customers, financial condition, results of operations and cash flows could be adversely impacted.

Finally, we may not be successful or efficient in developing or implementing new production processes. Innovation in production processes involves significant expense and carries inherent risks. Such risks may include difficulties in designing, developing, implementing, and scaling up new process technologies, development and production timing delays, lower than anticipated manufacturing yields, product defects, and inability to consistently meet customers' product specifications, performance and carbon intensity, or cost requirements, among others. Errors, defects in materials, operating permit and license delays, customer product returns, interruption in our supply of materials or resources, and disruptions at our facilities due to accidents, maintenance issues, or unsafe working conditions, all could affect the timing, efficiency, or success of our production processes. Such production issues can lead to increased costs and may affect our ability to meet product demand, which could adversely impact our business and results from operations.

We may not be successful in finding future strategic partners for continuing development of additional offtake and feedstock opportunities or tolling and downstream conversion of our products.

We may seek to develop additional strategic partnerships to increase feedstock supply and offtake amounts due to manufacturing constraints or capital costs required to develop our products. We may not be successful in our efforts to establish such strategic partnerships or other alternative arrangements for our products or technology because our research and development pipeline may be insufficient, our products may be deemed to be at too early of a stage of development for collaborative effort or third parties may not view our products as having the requisite potential to demonstrate commercial success.

If we are unable to reach agreements with suitable collaborators on a timely basis, on acceptable terms, or at all, we may have to curtail the development of our products, delay commercialization, reduce the scope of any sales or marketing activities or increase expenditures and undertake development or commercialization activities at our own expense. If we elect to fund development or commercialization activities on our own, we may need to obtain additional expertise and additional capital, which may not be available to us on acceptable terms or at all. If we fail to enter into collaborations and do not have sufficient funds or expertise to undertake the necessary development and commercialization activities, we may not be able to develop additional products and our business, financial condition, results of operations and prospects may be materially and adversely affected.

We may rely heavily on future collaborative and supply chain partners.

We have entered into, and may enter into, strategic partnerships to develop and commercialize our current and future research and development programs with other companies to accomplish one or more of the following:

- obtain capital, equipment and facilities;
- obtain funding for research and development programs, product development programs and commercialization activities;
- obtain expertise in relevant markets;
- obtain access to raw materials;
- obtain sales and marketing services or support;
- obtain conversion services and other supply chain support; and/or
- obtain access to intellectual property and ensure freedom to operate.

We may not be successful in establishing or maintaining suitable partnerships, and we may not be able to negotiate collaboration agreements having terms satisfactory to us, or at all. Failure to make or maintain these arrangements or a delay or failure in a collaborative partner's performance under any such arrangements could harm our business and financial condition.

In addition, global supply chain disruptions have caused, and may continue to cause, delays in the shipment of goods, particularly those made in Asian countries. We have incurred, and may continue to incur, additional costs to expedite deliveries of such goods or to obtain substitute goods that are available to us sooner. Continued supply chain disruptions and our efforts to mitigate them may adversely impact our financial condition, results of operations, and cash flows.

We have entered into and may in future enter into collaborations, strategic alliances, or licensing arrangements, which expose us and our intellectual property to competitive risks and limitations associated with third-party collaborations and that may not produce the benefits we anticipate.

We have entered, and may in the future enter, into license and collaboration arrangements for the development and production of some of our materials and products. For example, in February 2023, we entered into a license agreement pursuant to which we intend to collaborate on the development of a plant to produce high-value derivatives of CMF. In the future, we may enter into additional license and collaboration arrangements. Any collaboration we enter into is subject to numerous risks. Such risks may include, among others, collaborators' significant discretion to determine the effort and resources they will apply to the collaboration, to delay or elect not to continue development of a product or process under the collaboration, or to develop, independently or with third parties, products or processes that compete directly or indirectly with our products or manufacturing processes. A collaborator's development, sales, or marketing activities or other operations may not comply with applicable laws resulting in civil or criminal proceedings.

In addition, we could grant exclusive rights to our collaborators that would prevent us from collaborating with others. Collaborators may not properly maintain or defend our intellectual property rights or may use our intellectual property or proprietary information in a way that gives rise to actual or threatened litigation that could jeopardize or invalidate our intellectual property or proprietary information or expose us to potential liability. Our collaborators may own or co-own intellectual property covering products that result from our collaboration with them, depriving us of the exclusive right to develop or commercialize such intellectual property. Disputes may arise with respect to the ownership of any intellectual property developed pursuant to our collaborations.

Disputes between us and a collaborator may delay or terminate the development or commercialization of our products or result in costly litigation or arbitration that diverts management attention and resources. Termination of a collaboration may also result in a need for additional capital to pursue further development of the applicable current or future products.

Additionally, we may seek to enter into additional collaborations, joint ventures, licenses and other similar arrangements for the development of our products, due to capital costs required to develop the product or potential manufacturing constraints. We may not be successful in our efforts to establish such collaborations for our products because our products may be deemed to be at too early of a stage of development for collaborative effort or third parties may not view our products as having the requisite potential to demonstrate a significant commercial opportunity. In addition, we face significant competition in seeking appropriate strategic partners, and the negotiation process can be time consuming and complex. Further, any future collaboration agreements may restrict us from entering into additional agreements with potential collaborators. We cannot be certain that, following a strategic transaction or license, we will achieve an economic benefit that justifies such transaction. Even if we are successful in our efforts to establish such collaborations, the terms that we agree upon may not be favorable to us, and we may not be able to maintain such collaborations.

In addition, any potential future collaborations may be terminable by our strategic partners, and we may not be able to adequately protect our rights under these agreements. Furthermore, strategic partners may negotiate for certain rights to control decisions regarding the development of our products, and may not conduct those activities in the same manner as we do. Any termination of collaborations we enter into in the future, or any delay in the development of products under such collaborations, could delay the manufacturing and sales of our products, which could have a material adverse effect on our business, financial condition and results of operations.

We may become subject to product liability claims that may not be covered by insurance and could require us to pay substantial sums.

We are subject to an inherent risk of, and adverse publicity associated with, product liability and other liability claims, whether or not such claims are valid. In addition, our customers are subject to product liability claims, and could seek contribution from us. A successful product liability claim or series of claims against us could adversely impact the specialty chemicals industry, our reputation or our financial condition or results of operations. Product liability insurance may not be available to us on commercially acceptable terms, or at all. Even if such insurance is available, product liability or other claims may exceed our insurance coverage limits. A successful product liability claim that exceeds our insurance coverage limits, for which we are not otherwise indemnified, could require us to pay substantial sums and could harm our business, financial condition or results of operations.

Climate change may impact the availability of our facilities and, in addition, we may incur substantial costs to comply with climate change legislation and related regulatory initiatives.

Changing weather patterns and the increase in frequency of severe storms such as hurricanes and tornadoes could cause disruptions or the complete loss of our facilities or delay the construction of future facilities. In addition, climate change concerns, and changes in the regulation of such concerns, including greenhouse gas emissions, could also subject us to additional costs and restrictions, including increased energy and raw materials costs which could negatively impact our financial condition and results of operations. Climate change may also negatively impact the availability of our feedstock. The effects of climate change can not only adversely impact our operations, but also that of its suppliers and customers, and can lead to increased regulations and changes in consumer preferences, which could adversely affect our business, results of operations and financial condition.

Unfavorable global economic conditions could adversely affect our business, financial condition and results of operations.

Our results of operations could be adversely affected by general conditions in the global economy and in the global financial markets, including inflation and supply disruption. A domestic or global financial crisis can cause extreme volatility and disruptions in the capital and credit markets. A severe or prolonged economic downturn, which could result from an event like the COVID-19 pandemic or the global sanctions imposed against Russia following its military intervention in Ukraine, could result in a variety of risks to our business, including our inability to purchase necessary supplies on acceptable terms, if at all, and our inability to raise additional capital when needed on acceptable terms, if at all. A weak or declining economy could strain our suppliers, possibly resulting in supply disruption, or cause delays in payments for our services by third-party payers or our collaborators. Any of the foregoing could harm our business and we cannot anticipate all of the ways in which the current economic climate and financial market conditions could adversely impact our business.

Our operating results may fluctuate significantly as a result of a variety of factors, many of which are outside of our control.

We are subject to, among other things, the following factors that may negatively affect our operating results:

- the announcement or introduction of new products by our competitors;
- our ability to upgrade and develop our systems and infrastructure to accommodate growth;
- our ability to attract and retain key personnel in a timely and cost-effective manner;
- our ability to attract new customer and retain existing customers;
- technical difficulties;
- the amount and timing of operating costs and capital expenditures relating to the expansion of our business, operations and infrastructure;
- our ability to identify and enter into relationships with appropriate and qualified third-party providers of necessary testing and manufacturing services;
- regulation by federal, state or local governments; and
- general economic conditions, as well as economic conditions specific to the plastics and fuels industries, and other industries related to compostable or biodegradable substitutes for non-biodegradable plastics, as well as changes to commodity prices to which prices in some of our contracts are indexed.

As a result of our limited operating history and the nature of the markets in which we compete, it is difficult for us to forecast our revenues or earnings accurately. We have based our anticipated future expense levels largely on our investment plans and estimates of future events, although certain of our expense levels will, to a large extent, become fixed. As a strategic response to changes in the competitive environment, we may from time to time make certain decisions concerning expenditures, pricing, service or marketing that could harm our business, results of operations and financial condition. Due to the foregoing factors, our revenues and operating results are difficult to forecast.

Risks Related to Government Regulation

Compliance with extensive environmental, health and safety laws could require material expenditures, changes in our operations or site remediation.

We use hazardous materials in our production process, and our operations also produce hazardous waste. The manufacture, transportation and sale of our products can present potentially significant health and safety concerns and are also under increased public and governmental scrutiny. Our products are also used in a variety of applications that have specific regulatory requirements such as those relating to products that have contact with food or are used for medical applications.

Accordingly, our operations are subject to environmental, health and safety laws and regulations at the international, national, state and local level in multiple jurisdictions. These laws and regulations govern, among other things, air emissions, wastewater discharges, solid and hazardous waste management and disposal, occupational health and safety, including dust and noise control, site remediation programs and chemical use and management. Many of these laws and regulations have become more stringent over time and the costs of compliance with these requirements may increase, including costs associated with any necessary capital investments. In addition, our plants will require operating permits that are subject to renewal and, in some circumstances, revocation. The necessary permits may not be issued or continue in effect, and renewals of any issued permits may contain significant new requirements or restrictions. The nature of the specialty chemicals industry exposes us to risks of liability due to the use, production, management, storage, transportation and sale of materials that are heavily regulated or hazardous and can cause contamination or personal injury or damage if released into the environment.

Compliance with environmental laws and regulations generally increases the costs of transportation and storage of raw materials and finished products, as well as the costs of storage and disposal of wastes. We may incur substantial costs, including fines, damages, criminal or civil sanctions and remediation costs, or experience interruptions in our operations for violations arising under environmental laws, regulations or permit requirements. In addition, the market for bioplastics is heavily influenced by applicable federal, state and local government laws, regulations and policies as well as public perception. Changes in these laws, regulations and policies or how these laws, regulations and policies are implemented and enforced could cause the demand for bioplastics to decline and deter investment in the research and development of bioplastics. Concerns associated with bioplastics, including land usage, national security interests, deforestation, food crop

usage and other environmental concerns, continue to receive legislative, industry and public attention. This attention could result in future legislation, regulation and/or administrative action that could adversely affect our business.

Furthermore, various petrochemical products, including plastics, have faced increased public scrutiny due to negative coverage of plastic waste in the environment, which has resulted in local, state, federal and foreign governments proposing and in some cases approving, restrictions or bans on the manufacture, consumption and disposal of certain petrochemical products. Although our products are intended to replace petrochemical products, increased regulation on the use of such products or other products in the specialty chemicals industry, whatever their scope or form, could increase our costs of production, impact overall consumption of our products or result in misdirected negative publicity. Any inability to address these requirements and any regulatory or policy changes could harm our business, financial condition and results of operations.

We are subject to U.S. and foreign anti-corruption and anti-money laundering laws and regulations. We could face criminal liability and other serious consequences for violations, which would harm our business.

We are subject to the U.S. Foreign Corrupt Practices Act of 1977, as amended, the U.S. domestic bribery statute contained in 18 U.S.C. § 201, the U.S. Travel Act, the USA PATRIOT Act and possibly other anti-bribery and anti-money laundering laws in countries in which we conduct activities. Anti-corruption laws are interpreted broadly and prohibit companies and their employees, agents, contractors and other collaborators from authorizing, promising, offering or providing, directly or indirectly, improper payments or anything else of value to recipients in the public or private sector. We can also be held liable for the corrupt or other illegal activities of our employees, agents, contractors and other collaborators, even if we do not explicitly authorize or have actual knowledge of such activities. Any violations of the laws and regulations described above may result in substantial civil and criminal fines and penalties, imprisonment, the loss of export or import privileges, debarment, tax reassessments, breach of contract and fraud litigation, reputational harm and other consequences.

Our operating plan may require us to source feedstock and supplies internationally, and foreign currency exchange rate fluctuations and changes to international trade agreements, tariffs, import and excise duties, taxes or other governmental rules and regulations could adversely affect our business, financial condition, results of operations and prospects.

Our expansion model is global and we will need to source feedstock and supplies from suppliers around the world. In particular, our manufacturing process uses local timber and forest residues as our primary raw materials, which must be sourced locally. For the Origin 1 plant, this means we will need to source feedstock, as well as other supplies, from Canadian suppliers or arrange for transport of such feedstock and supplies into Canada. The U.S. federal government or other governmental bodies may propose changes to international trade agreements, tariffs, taxes and other government rules and regulations, and may impose sanctions limiting trade with other countries. If foreign currency exchange rates fluctuate or any restrictions or significant increases in costs or tariffs or sanctions are imposed related to feedstock and supplies sourced to our plants as a result of amendments to existing trade agreements or otherwise, this may increase our supply and shipping costs, resulting in potential decreased margins. We may expand our operations to countries with unstable governments that are subject to instability, corruption, changes in rules and regulations and other potential uncertainties that could harm our business, financial condition, results of operations and prospects. The extent to which our margins could decrease in response to any future tariffs is uncertain. We continue to evaluate the impact of trade agreements, as well as foreign currency exchange rate fluctuations and other recent changes in foreign trade policy on our supply chain, costs, sales and profitability. In addition, COVID-19 has resulted in increased travel restrictions and the extended shutdown of certain businesses throughout the world. The impact of COVID-19 on our business is uncertain at this time and will depend on future developments; however, prolonged closures in Canada, Europe, Asia and elsewhere may disrupt the operations of certain suppliers of feedstock and other supplies, which could, in turn, negatively impact our business, financial condition, results of operations and prospects.

Risks Related to Our Intellectual Property

Our business relies on proprietary information and other intellectual property, and our failure to protect our intellectual property rights could harm our competitive advantages with respect to the use, manufacturing, sale or other commercialization of our processes, technologies and products, which may have an adverse effect on our results of operations and financial condition.

We intend to make significant capital investments into the research and development of proprietary information and other intellectual property as we develop, improve and scale our processes, technologies and products, and failure to fund and make these investments, or underperformance of the technology funded by these investments, could severely impact our business, financial condition, results of operations and prospects.

If we fail to adequately protect our intellectual property rights, such failure could result in the reduction or loss of our competitive advantage. We may be unable to prevent third parties from using our proprietary information and other intellectual property without our authorization or from independently developing proprietary information and other intellectual property that is similar to ours, particularly in those countries where the laws do not protect our proprietary rights to the same degree as in the U.S. or those countries where we do not have intellectual property rights protection. The use of our proprietary information and other intellectual property by others could reduce or eliminate competitive advantages that we have developed, potentially causing us to lose sales or actual or potential customers, or otherwise harm our business. If it becomes necessary for us to litigate to protect these rights, any proceedings could be burdensome and costly, could result in counterclaims challenging our intellectual property (including validity or enforceability) or accusing us of infringement, and we may not prevail.

Our patent applications and issued patents may be practiced by third parties without our knowledge. Our competitors may also attempt to design around our patents or copy or otherwise obtain and use our proprietary information and other intellectual property. Moreover, our competitors may already hold or have applied for patents in the U.S. or abroad that, if enforced, could possibly prevail over our patent rights or otherwise limit our ability to manufacture, sell or otherwise commercialize one or more of our products in the U.S. or abroad. With respect to our pending patent applications, we may not be successful in securing issued patents, or the claims of such patents may be narrowed, any of which may limit our ability to protect inventions that these applications were intended to cover, which could harm our ability to prevent others from exploiting our technologies and commercializing products similar to our products. In addition, the expiration of a patent can result in increased competition with consequent erosion of profit margins.

The applicable governmental authorities may not approve our pending service mark and trademark applications. A failure to obtain trademark registrations in the U.S. and in other countries could limit our ability to obtain and retain our trademarks in those jurisdictions. Moreover, third parties may seek to oppose our applications or otherwise challenge the resulting registrations. In the event that our trademarks are not approved or are successfully challenged by third parties, we could be forced to rebrand our products, which could result in loss of brand recognition and could require us to devote significant resources to rebranding and advertising and marketing new brands. The failure of our patents, trademarks, trade secrets, or confidentiality agreements to protect our proprietary information and other intellectual property, including our processes, apparatuses, technology, trade secrets, trade names and proprietary manufacturing expertise, methods and compounds, could have a material adverse effect on our business and results of operations.

Some of our intellectual property has been or will be discovered, conceived or developed through research funded by the Canadian government and thus may be subject to federal regulations providing for certain rights for the Canadian government or imposing certain obligations on us, such as limitations on exploiting such intellectual property outside of Canada. Compliance with such regulations may limit our exclusive rights and ability to commercialize our products and technology outside of Canada.

We may face patent infringement and other intellectual property claims that could be costly to defend, result in injunctions and significant damage awards or other costs (including indemnification of third parties or costly licensing arrangements, if licenses are available at all) and limit our ability to use certain key technologies in the future or require development of non-infringing products or technologies, which may cause us to incur significant unexpected costs, prevent us from commercializing our products and otherwise harm our business.

The various bioindustrial markets in which we plan to operate are subject to frequent and extensive litigation regarding patents, trade secrets and other intellectual property rights. Many of our competitors have a substantial amount of intellectual property. We cannot guarantee that our processes and products do not and will not infringe issued patents (whether present or future) or other intellectual property rights belonging to others.

From time to time, we oppose third-party patents that we consider overbroad or otherwise invalid in order to maintain the necessary freedom to operate fully in our various business lines without the risk of being sued for patent infringement. If, however, the oppositions are unsuccessful, we could be liable for infringement or have to take other remedial or curative actions to continue our manufacturing and sales activities with respect to one or more products.

We may also be subject to legal proceedings and claims in the ordinary course of our business, including claims of alleged infringement or misappropriation of the patents, trademarks, trade secrets and other intellectual property rights of third parties by us or our licensees in connection with their use of our products. Intellectual property litigation is expensive and time-consuming, regardless of the merits of any claim, and could divert our management's attention from operating our business.

If we were to discover that our processes, technologies or products infringe or misappropriate the valid intellectual property rights of others, we might need to obtain licenses from these parties or substantially re-engineer our processes, technologies or products in order to avoid infringement. We may not be able to obtain the necessary licenses on acceptable terms, or at all, or be able to re-engineer our processes, technologies or products successfully. Moreover, if we or our licensees are sued for infringement or misappropriation and lose, we could be required to pay substantial damages, indemnify our licensees and/or be enjoined from using or selling the infringing processes, technologies or products. If we incur significant costs to litigate infringement or misappropriation claims or to obtain licenses, or if our inability to obtain required licenses prevents us from using or selling our processes, technologies or products, it could have a material adverse effect on our business and results of operations.

We rely on trade secrets to protect our technology, and our failure to maintain trade secret protection could limit our ability to compete.

We rely on trade secrets to protect some of our technology and proprietary information, especially where we believe patent protection is not appropriate or obtainable. However, trade secrets can be difficult to protect. The misappropriation or other compromise of our trade secrets may lead to a reduction or loss of our competitive advantages resulting from such trade secrets. Further, litigating a claim that a third party had misappropriated our trade secrets would be expensive and time consuming, and the outcome would be unpredictable. Moreover, if our competitors independently develop similar knowledge, methods and know-how, it will be difficult for us to enforce our rights and our business could be harmed.

Our confidentiality agreements could be breached or may not provide meaningful protection for our trade secrets or proprietary manufacturing expertise. Adequate remedies may not be available in the event of an unauthorized use or disclosure of our trade secrets and manufacturing expertise. Violations by others of our confidentiality agreements and the loss of employees who have specialized knowledge and expertise could harm our competitive position resulting from the exclusive nature of such knowledge and expertise and cause our sales and operating results to decline as a result of increased competition. In addition, others may obtain knowledge of our trade secrets through independent development or other access by legal means.

Other Risks Related to Our Business

Our management has limited experience in operating a public company.

Our executive officers have limited experience in the management of a publicly traded company subject to significant regulatory oversight and reporting obligations under federal securities laws. We may not have adequate personnel with the appropriate level of knowledge, experience and training in the accounting policies, practices or internal controls over financial reporting required of public companies in the United States. It is possible that we will be required to expand our employee base and hire additional employees to support our operations as a public company, which will increase our operating costs in future periods.

We are dependent on management and key personnel, and our business would suffer if we fail to retain our key personnel and attract additional highly skilled employees.

Our success depends on the specialized skills of our management team and key operating personnel. This may present particular challenges as we operate in a highly specialized industry sector, which may make replacement of our management team and key operating personnel difficult. A loss of our managers or key employees, or their failure to satisfactorily perform their responsibilities, could have an adverse effect on our business, financial condition, results of operations and prospects.

Our future success will depend on our ability to identify, hire, develop, motivate and retain highly qualified personnel for all areas of our organization, particularly research and development, recycling technology, operations and sales. Trained and experienced personnel are in high demand and may be in short supply. Many of the companies that we compete with for experienced employees have greater resources than us and may be able to offer more attractive terms of employment. In addition, we invest significant time and expense in training employees, which increases their value to competitors that may seek to recruit them. We may not be able to attract, develop and maintain the skilled workforce necessary to operate our business, and labor expenses may increase as a result of a shortage in the supply of qualified personnel, which will negatively impact our business, financial condition, results of operations and prospects.

We previously identified a material weakness in our internal control over financial reporting that we have concluded has been remediated, though we may identify additional material weaknesses in the future or fail to maintain effective internal control over financial reporting, which may result in material misstatements of our consolidated financial statements or cause us to fail to meet our periodic reporting obligations.

In connection with the audit of our consolidated financial statements for the fiscal years ended December 31, 2019 and December 31, 2020, during the course of preparing for the Business Combination, and during the second quarter 2021 and third quarter 2021 interim reviews, we identified a material weakness in our internal controls over financial reporting. We implemented and continue to employ measures designed to improve our internal control over financial reporting, which remediated this material weakness in the fourth quarter of 2021. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of its annual or interim financial statements will not be prevented or detected on a timely basis.

If we are unable to successfully remediate any future material weaknesses in our internal control over financial reporting, or if we identify any additional material weaknesses, the accuracy and timing of our financial reporting may be adversely affected, we may be unable to maintain compliance with securities law requirements regarding timely filing of periodic reports in addition to applicable Nasdaq listing requirements, investors may lose confidence in our financial reporting and our stock price may decline as a result. We also could become subject to investigations by Nasdaq, the SEC or other regulatory authorities.

As a public company, we are also required, pursuant to Section 404 of the Sarbanes-Oxley Act, to furnish a report by management on, among other things, the effectiveness of its internal control over financial reporting for future annual reports on Form 10-K to be filed with the SEC. This assessment will need to include disclosure of any material weaknesses identified by management in our internal control over financial reporting. Our independent registered public accounting firm will also be required to audit the effectiveness of our internal control over financial reporting in future annual reports on Form 10-K to be filed with the SEC. We will be required to disclose changes made in our internal control over financial reporting on a quarterly basis. Failure to comply with the Sarbanes-Oxley Act could potentially subject us to sanctions or investigations by the SEC, the applicable stock exchange or other regulatory authorities, which would require additional financial and management resources. In order to evaluate the effectiveness of internal control over financial reporting, as required by Section 404 of the Sarbanes-Oxley Act, management has conducted an assessment, including testing, using the criteria in Internal Control – Integrated Framework, issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”) using the 2013 framework. Our system of internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Because of its inherent limitations, internal control over financial reporting may not prevent or detect all misstatements.

We are subject to stringent and changing U.S. and foreign laws, regulations, rules, contractual obligations, policies and other obligations related to data privacy and security. Our actual or perceived failure to comply with such obligations could lead to regulatory investigations or actions; litigation; fines and penalties; disruptions of our business operations; reputational harm; loss of revenue or profits; loss of customers or sales; and other adverse business consequences.

In the ordinary course of business, we collect, receive, store, process, generate, use, transfer, disclose, make accessible, protect, secure, dispose of, transmit, and share (commonly known as processing) personal data and other sensitive information, including proprietary and confidential business data, trade secrets, and intellectual property. Our data processing activities subject us to various data privacy and security obligations, which can include laws, regulations, guidance, industry standards, external and internal privacy and security policies, contracts, and other obligations that govern the processing of personal data by us and on our behalf.

In the United States, federal, state, and local governments have enacted numerous data privacy and security laws, including data breach notification laws, personal data privacy laws, and consumer protection laws. For example, the California Consumer Privacy Act of 2018 (“CCPA”) imposes obligations on businesses to which it applies, such as providing specific disclosures in privacy notices and affording California residents certain rights related to their personal data and applies to personal information of consumers, business representatives, and employees. The CCPA provides for civil penalties of up to \$7,500 per violation and allows private litigants affected by certain data breaches to recover significant statutory damages. In addition, the California Privacy Rights Act of 2020 (“CPRA”), effective January 1, 2023, expands the CCPA, including by establishing a new California Privacy Protection Agency to implement and enforce the CPRA and adding a new right for individuals to correct their personal information. Other states have also enacted data privacy laws, including Virginia and Colorado. In addition, data privacy and security laws have been proposed at the federal, state, and local levels in recent years, which could further complicate compliance efforts.

Outside the United States, an increasing number of laws, regulations, and industry standards apply to data privacy and security. For example, the European Union’s General Data Protection Regulation (“EU GDPR”) and the United Kingdom’s GDPR (“UK GDPR”) impose strict requirements for processing the personal data of individuals located in the European Economic Area (“EEA”) and the UK, respectively. For example, under the EU GDPR, government regulators may impose temporary or definitive bans on data processing, as well as fines of up to 20.0 million euros or 4% of annual global revenue, whichever is greater. The GDPR also allows for private litigation related to processing of personal data brought by classes of data subjects or consumer protection organizations authorized at law to represent their interests. Additionally, in Canada, the Personal Information Protection and Electronic Documents Act (“PIPEDA”) and various related provincial laws, as well as Canada’s Anti-Spam Legislation (“CASL”), may apply to our operations. We also target customers in Asia, and may be subject to new and emerging data privacy regimes in Asia, such as China’s Personal Information Protection Law, and Japan’s Act on the Protection of Personal Information.

In addition, certain jurisdictions have enacted data localization laws and cross-border personal data transfer laws, which could make it more difficult to transfer information across jurisdictions (such as transferring or receiving personal data that originates in Europe or other jurisdictions). Existing mechanisms that may facilitate cross-border personal data transfers may change or be invalidated.

We are also bound by contractual obligations related to data privacy and security, and our efforts to comply with such obligations may not be successful. We publish privacy policies, marketing materials and other statements, such as compliance with certain certifications or self-regulatory principles, regarding data privacy and security. If these policies, materials or statements are found to be deficient, lacking in transparency, deceptive, unfair, or misrepresentative of our practices, we may be subject to investigation, enforcement actions by regulators or other adverse consequences.

Obligations related to data privacy and security are quickly changing in an increasingly stringent fashion, creating some uncertainty as to the effective future legal framework. Additionally, these obligations may be subject to differing applications and interpretations, which may be inconsistent or in conflict among jurisdictions. Preparing for and complying with these obligations may require us to devote significant resources (including, without limitation, financial and time-related resources). These obligations may necessitate changes to our information technologies, systems, and practices and to those of any third parties that process personal data on our behalf.

Although we endeavor to comply with all applicable data privacy and security obligations, we may at times fail (or be perceived to have failed) to do so. Moreover, despite our efforts, our personnel or third parties upon whom we rely may fail to comply with such obligations, which could negatively impact our business operations and compliance posture. For example, any failure by a third-party processor to comply with applicable law, regulations, or contractual obligations could result in adverse effects, including inability to or interruptions in our ability to operate our business and proceedings against us by governmental entities or others.

If we fail, or are perceived to have failed, to address or comply with data privacy and security obligations, we could face significant consequences. These consequences may include, but are not limited to, government enforcement actions (e.g., investigations, fines, penalties, audits, inspections, and similar); litigation (including class-related claims); additional reporting requirements and/or oversight; bans on processing personal data; and orders to destroy or not use personal data.

Any of these events could have a material adverse effect on our reputation, business, or financial condition, including but not limited to: loss of customers; interruptions or stoppages in our business operations; inability to process personal data or to operate in certain jurisdictions; limited ability to develop or commercialize our products; expenditure of time and resources to defend any claim or inquiry; adverse publicity; or revision or restructuring of our operations.

If our information technology systems or data, or those of third parties upon which we rely, are or were compromised, we could experience adverse consequences resulting from such compromise, including but not limited to regulatory investigations or actions; litigation; fines and penalties; disruptions of our business operations; reputational harm; loss of revenue or profits; loss of customers; and other adverse consequences.

In the ordinary course of our business, we may process proprietary, confidential, and sensitive data, including personal data, intellectual property, and trade secrets (collectively, sensitive information). We rely upon third-party service providers and technologies to operate critical business systems to process sensitive information in a variety of contexts, including, without limitation, third-party providers of cloud-based infrastructure, encryption and authentication technology, employee email, content delivery to customers, manufacturing processing, process orders and invoices, payments, inventory management and other functions. We also depend on these systems to respond to customer inquiries, support our overall internal control process, maintain property, plant and equipment records, and pay amounts due to vendors and other creditors. Our ability to monitor these third parties' information security practices is limited, and these third parties may not have adequate information security measures in place. While we may be entitled to damages if our third-party service providers fail to satisfy their privacy or security-related obligations to us, any award may be insufficient to cover our damages, or we may be unable to recover such award. In addition, supply-chain attacks have increased in frequency and severity, and we cannot guarantee that third parties' infrastructure in our supply chain or our third-party partners' supply chains have not been compromised. We may share or receive sensitive information with or from third parties.

Cyberattacks, malicious internet-based activity, and online and offline fraud are prevalent and continue to increase. These threats are becoming increasingly difficult to detect. These threats come from a variety of sources, including traditional computer "hackers," threat actors, personnel (such as through theft or misuse), sophisticated nation-states, and nation-state-supported actors. Some actors now engage and are expected to continue to engage in cyber-attacks, including without limitation nation-state actors for geopolitical reasons and in conjunction with military conflicts and defense activities. During times of war and other major conflicts, we and the third parties upon which we rely may be vulnerable to a heightened risk of these attacks, including retaliatory cyber-attacks, that could materially disrupt our systems and operations, supply chain, and ability to produce, sell and distribute our products.

We and the third parties upon which we rely may be subject to a variety of evolving threats, including but not limited to social-engineering attacks (including through phishing attacks), malicious code (such as viruses and worms), malware (including as a result of advanced persistent threat intrusions), denial-of-service attacks (such as credential stuffing), credential harvesting, personnel misconduct or error, ransomware attacks, supply-chain attacks, software bugs, server malfunctions, software or hardware failures, loss of data or other information technology assets, adware, telecommunications failures, earthquakes, fires, floods, and other similar threats.

Ransomware attacks, including those perpetrated by organized criminal threat actors, nation-states, and nation-state-supported actors, are becoming increasingly prevalent and severe – particularly for companies like ours that are engaged in manufacturing – and can lead to significant interruptions in our operations, loss of data and income, reputational harm, and diversion of funds. Extortion payments may alleviate the negative impact of a ransomware attack, but we may be unwilling or unable to make such payments due to, for example, applicable laws or regulations prohibiting such payments. Additionally, remote work has become more common and has increased risks to our information technology systems and data, as more of our employees utilize network connections, computers and devices outside our premises or network, including working at home, while in transit and in public locations. Future or past business transactions (such as acquisitions or integrations) could also expose us to additional cybersecurity risks and vulnerabilities, as our systems could be negatively affected by vulnerabilities present in acquired or integrated entities' systems and technologies. A security incident or other interruption could result in unauthorized, unlawful, or accidental acquisition, modification, destruction, loss, alteration, encryption, disclosure of, or access to our sensitive information. A security incident or other interruption could disrupt our ability (and that of third parties upon whom we rely) to provide our products.

We may expend significant resources or modify our business activities in an effort to protect against security incidents. Certain data privacy and security obligations may require us to implement and maintain specific security measures, industry-standard or reasonable security measures to protect our information technology systems and sensitive information.

While we have implemented security measures designed to protect against security incidents, there can be no assurance that these measures will be effective. We take steps to detect and remediate vulnerabilities, but we may not be able to detect and remediate all vulnerabilities because the threats and techniques used to exploit the vulnerability change frequently and are often sophisticated in nature. Therefore, such vulnerabilities could be exploited but may not be detected until after a security incident has occurred. These vulnerabilities pose material risks to our business.

Despite our efforts to identify and remediate vulnerabilities, if any, in our information technology systems, our efforts may not be successful. Further, we may experience delays in developing and deploying remedial measures designed to address any such identified vulnerabilities. Applicable data privacy and security obligations may require us to notify relevant stakeholders of security incidents. Such disclosures are costly, and the disclosures or the failure to comply with such requirements could lead to adverse consequences.

If we (or a third party upon whom we rely) experience a security incident or are perceived to have experienced a security incident, we may experience adverse consequences. These consequences may include: government enforcement actions (for example, investigations, fines, penalties, audits, and inspections); additional reporting requirements and/or oversight; restrictions on processing data (including personal data); litigation (including class claims); indemnification obligations; negative publicity; reputational harm; monetary fund diversions; interruptions in our operations (including availability of data); financial loss; and other similar harms. Security incidents and attendant consequences may deter negatively impact our ability to grow and operate our business. Our contracts may not contain limitations of liability, and even where they do, there can be no assurance that limitations of liability in our contracts are sufficient to protect us from liabilities, damages, or claims related to our data privacy and security obligations. We cannot be sure that our insurance coverage will be adequate or sufficient to protect us from or to mitigate liabilities arising out of our data privacy and security practices, that such coverage will continue to be available on commercially reasonable terms or at all, or that such coverage will pay future claims. In addition to experiencing a security incident, third parties may gather, collect, or infer sensitive information about us from public sources, data brokers, or other means that reveals competitively sensitive details about our organization and could be used to undermine our competitive advantage or market position.

Risks Related to Ownership of Our Shares

Our Certificate of Incorporation provides, subject to limited exceptions, that the Delaware Court of Chancery is the sole and exclusive forum for certain stockholder litigation matters, which could limit our stockholders' ability to obtain a chosen judicial forum for disputes with us or our directors, officers, employees or stockholders.

Our Certificate of Incorporation requires, to the fullest extent permitted by law, that derivative actions brought in our name, actions against directors, officers and employees for breach of fiduciary duty and other similar actions may be brought in the Delaware Court of Chancery or, if that court lacks subject matter jurisdiction, another federal or state court situated in the State of Delaware. Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock shall be deemed to have notice of and consented to the forum provisions in our Certificate of Incorporation. In addition, our Certificate of Incorporation provides that the federal district courts of the United States shall be the exclusive forum for the resolution of any complaint asserting a cause of action under the Securities Act.

This choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum of its choosing for disputes with us or any of our directors, officers, other employees or stockholders, which may discourage lawsuits with respect to such claims. Alternatively, if a court were to find the choice of forum provision contained in our Certificate of Incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could harm our business, operating results and financial condition.

Our charter documents and Delaware law could prevent a takeover that stockholders consider favorable and could also reduce the market price of our stock.

Our Certificate of Incorporation and Bylaws contain provisions that could delay or prevent a change in control of us. These provisions could also make it more difficult for stockholders to elect directors and take other corporate actions. These provisions include:

- initially providing for a classified board of directors with staggered, three-year terms;
- authorizing our Board of Directors (the "Board") to issue Preferred Stock with voting or other rights or preferences that could discourage a takeover attempt or delay changes in control;
- prohibiting cumulative voting in the election of directors;

- providing that vacancies on our Board may generally be filled only by a majority of directors then in office, even though less than a quorum;
- prohibiting the adoption, amendment or repeal of the Bylaws or the repeal of the provisions of our Certificate of Incorporation regarding the election and removal of directors without the required approval of at least two-thirds of the shares entitled to vote at an election of directors;
- prohibiting stockholder action by written consent;
- limiting the persons who may call special meetings of stockholders; and
- requiring advance notification of stockholder nominations and proposals.

These provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our Board, which is responsible for appointing the members of our management. In addition, the provisions of Section 203 of the General Corporation Law of the State of Delaware ("DGCL") will govern us. These provisions may prohibit large stockholders, in particular those owning 15% or more of our outstanding voting stock, from merging or combining with us for a certain period of time without the consent of our Board. These and other provisions in our Certificate of Incorporation and our Bylaws under Delaware law could discourage potential takeover attempts, reduce the price investors might be willing to pay in the future for shares of our Common Stock and result in the market price of our Common Stock being lower than it would be without these provisions.

Claims for indemnification by our directors and officers may reduce our available funds to satisfy successful third-party claims against us and may reduce the amount of money available to us.

Our Certificate of Incorporation and Bylaws provide that we will indemnify our directors and officers, in each case to the fullest extent permitted by Delaware law.

In addition, as permitted by Section 145 of the DGCL, the Bylaws and its indemnification agreements that we entered into with our directors and officers provide that:

- we will indemnify our directors and officers for serving us in those capacities or for serving other business enterprises at our request, to the fullest extent permitted by Delaware law. Delaware law provides that a corporation may indemnify such person if such person acted in good faith and in a manner such person reasonably believed to be in or not opposed to the best interests of the registrant and, with respect to any criminal proceeding, had no reasonable cause to believe such person's conduct was unlawful;
- we may, in our discretion, indemnify employees and agents in those circumstances where indemnification is permitted by applicable law;
- we will be required to advance expenses, as incurred, to our directors and officers in connection with defending a proceeding, except that such directors or officers shall undertake to repay such advances if it is ultimately determined that such person is not entitled to indemnification;
- we will not be obligated pursuant to our Bylaws to indemnify a person with respect to proceedings initiated by that person against us or our other indemnities, except with respect to proceedings authorized by our Board or brought to enforce a right to indemnification;
- the rights conferred in the Bylaws are not exclusive, and we are authorized to enter into indemnification agreements with our directors, officers, employees and agents and to obtain insurance to indemnify such persons; and
- we may not retroactively amend our Bylaw provisions to reduce our indemnification obligations to directors, officers, employees and agents.

We do not intend to pay dividends for the foreseeable future.

We have never declared or paid any cash dividends on our capital stock and do not intend to pay any cash dividends in the foreseeable future. We expect to retain future earnings, if any, to fund the development and growth of our business. Any future determination to pay dividends on our capital stock will be at the discretion of our Board. In addition, our loan agreements contain restrictions on our ability to pay dividends.

The market price and trading volume of our Common Stock may be volatile and could decline significantly.

The stock markets, including Nasdaq on which we have listed the shares of our Common Stock under the symbol “ORGN,” have from time to time experienced significant price and volume fluctuations. Even if an active, liquid and orderly trading market is sustained for our Common Stock, the market price of our Common Stock may be volatile and could decline significantly. In addition, the trading volume in our Common Stock may fluctuate and cause significant price variations to occur. If the market price of our Common Stock declines significantly, you may be unable to resell your shares at or above the market price of our Common Stock at which you purchased our Common Stock. We cannot assure you that the market price of Common Stock will not fluctuate widely or decline significantly in the future in response to a number of factors, including, among others, the following:

- the realization of any of the risk factors presented in this Annual Report;
- actual or anticipated differences in our estimates, or in the estimates of analysts, for our revenues, results of operations, level of indebtedness, liquidity or financial condition;
- additions and departures of key personnel;
- failure to comply with the requirements of Nasdaq;
- failure to comply with the Sarbanes-Oxley Act or other laws or regulations;
- future issuances, sales, resales or repurchases or anticipated issuances, sales, resales or repurchases, of our securities;
- publication of research reports about us;
- the performance and market valuations of other similar companies;
- commencement of, or involvement in, litigation involving us;
- broad disruptions in the financial markets, including sudden disruptions in the credit markets;
- speculation in the press or investment community;
- actual, potential or perceived control, accounting or reporting problems;
- changes in accounting principles, policies and guidelines; and
- other events or factors, including those resulting from infectious diseases, health epidemics and pandemics (including the ongoing COVID-19 public health emergency), natural disasters, war, acts of terrorism or responses to these events.

In the past, securities class-action litigation has often been instituted against companies following periods of volatility in the market price of their shares. This type of litigation could result in substantial costs and divert our management’s attention and resources, which could have a material adverse effect on us.

Our quarterly operating results may fluctuate significantly and could fall below the expectations of securities analysts and investors due to seasonality and other factors, some of which are beyond our control, resulting in a decline in our stock price.

Our quarterly operating results may fluctuate significantly because of several factors, including:

- labor availability and costs for hourly and management personnel;
- profitability of our products;
- changes in interest rates;
- impairment of long-lived assets;
- macroeconomic conditions, such as inflation and increasing interest rates, which may increase the risk of a potential recession;
- negative publicity relating to products we serve;
- changes in consumer preferences and competitive conditions;
- expansion to new markets; and

- fluctuations in commodity prices.

If securities or industry analysts do not publish or cease publishing research or reports about us, our business, or our market, or if they change their recommendations regarding our Common Stock adversely, then the price and trading volume of our Common Stock could decline.

The trading market for our Common Stock will be influenced by the research and reports that industry or securities analysts may publish about us, our business, our market, or our competitors. Accordingly, we must maintain confidence among current and future analysts, ratings agencies and other parties in our long-term financial viability and business prospects. Maintaining such confidence may be particularly complicated by certain factors including those that are largely outside of our control, such as limited operating history, market unfamiliarity, any delays in scaling manufacturing to meet demand and our eventual production and sales performance compared with the market expectations. If any of the analysts who may cover us change their recommendation regarding our Common Stock adversely, or provide more favorable relative recommendations about our competitors, the price of our Common Stock would likely decline. If any analyst who may cover us were to cease coverage of the us or fail to regularly publish reports on us, we could lose visibility in the financial markets, which could cause our stock price or trading volume to decline.

Future issuances of debt securities and equity securities may adversely affect us, including the market price of our Common Stock and may be dilutive to existing stockholders.

In the future, we may incur debt or issue equity-ranking senior to our Common Stock. Those securities will generally have priority upon liquidation. Such securities also may be governed by an indenture or other instrument containing covenants restricting its operating flexibility. Additionally, any convertible or exchangeable securities that we issue in the future may have rights, preferences and privileges more favorable than those of our Common Stock. Because our decision to issue debt or equity in the future will depend on market conditions and other factors beyond our control, we cannot predict or estimate the amount, timing, nature or success of our future capital raising efforts. As a result, future capital raising efforts may reduce the market price of our Common Stock and be dilutive to existing stockholders.

There can be no assurance that we will be able to comply with the continued listing standards of Nasdaq.

Our Common Stock and the public warrants that were issued in connection with Artius' initial public offering (the "Public Warrants") are currently listed on Nasdaq. If Nasdaq delists our securities from trading on its exchange for failure to meet the listing standards, we and our stockholders could face significant material adverse consequences including:

- a limited availability of market quotations for our securities;
- reduced liquidity for our securities;
- a determination that our Common Stock is a "penny stock" which will require brokers trading in our Common Stock to adhere to more stringent rules and possibly result in a reduced level of trading activity in the secondary trading market for our securities; or
- a decreased ability to issue additional securities or obtain additional financing in the future.

If we fail to satisfy the continued listing requirements of Nasdaq such as the corporate governance requirements or the minimum share price requirement, Nasdaq may take steps to delist our securities. Such a delisting would likely have a negative effect on the price of the securities and would impair your ability to sell or purchase the securities when you wish to do so. In the event of a delisting, we can provide no assurance that any action taken by us to restore compliance with listing requirements would allow our securities to become listed again, stabilize the market price or improve the liquidity of our securities, prevent our securities from dropping below the Nasdaq minimum share price requirement or prevent future non-compliance with Nasdaq's listing requirements. Additionally, if our securities are not listed on, or become delisted from, Nasdaq for any reason, and are quoted on the OTC Bulletin Board, an inter-dealer automated quotation system for equity securities that is not a national securities exchange, the liquidity and price of our securities may be more limited than if we were quoted or listed on Nasdaq or another national securities exchange. You may be unable to sell your securities unless a market can be established or sustained.

The National Securities Markets Improvement Act of 1996, which is a federal statute, prevents or preempts the states from regulating the sale of certain securities, which are referred to as "covered securities." Because Common Stock and Public Warrants are listed on Nasdaq, they are covered securities. Although the states are preempted from regulating the sale of our securities, the federal statute does allow the states to investigate companies if there is a suspicion of fraud, and, if there is a finding of fraudulent activity, then the states can regulate or bar the sale of covered securities in a particular case.

While we are not aware of a state, other than the State of Idaho, having used these powers to prohibit or restrict the sale of securities issued by blank check companies, certain state securities regulators view blank check companies unfavorably and might use these powers, or threaten to use these powers, to hinder the sale of securities of blank check companies in their states. Further, if we were no longer listed on Nasdaq, our securities would not be covered securities and we would be subject to regulation in each state in which we offer our securities.

Sales of a substantial number of shares of our common stock by our existing stockholders could cause the price of our common stock to decline.

At any time, sales of a substantial number of shares of our common stock in the public market could occur, or there could be a perception in the market that the holders of a large number of shares of common stock intend to sell shares, and any such event could reduce the market price of our common stock. Substantially all of the shares of our common stock outstanding and shares issued upon the exercise of stock options outstanding under our equity incentive plans, subject to applicable securities law restrictions and excluding shares of restricted stock that will remain unvested, may be able to be sold in the public market. We are unable to predict the effect that sales may have on the prevailing market price of Common Stock and Public Warrants.

To the extent our Warrants are exercised, additional shares of Common Stock will be issued, which will result in dilution to the holders of Common Stock and increase the number of shares eligible for resale in the public market. Sales, or the potential sales, of substantial numbers of shares in the public market by the selling securityholders could increase the volatility of the market price of Common Stock or adversely affect the market price of Common Stock.

There is no guarantee that the Warrants will be in the money at the time they become exercisable, and they may expire worthless.

The exercise price for our Warrants is \$11.50 per share of Common Stock. There is no guarantee that the Warrants will be in the money following the time they become exercisable and prior to their expiration, and as such, the Warrants may expire worthless. Our Warrants became exercisable on July 25, 2021.

We may amend the terms of the Warrants in a manner that may be adverse to holders with the approval by the holders of at least 50% of the then-outstanding Public Warrants. As a result, the exercise price of your Warrants could be increased, the exercise period could be shortened and the number of shares of our Common Stock purchasable upon exercise of a Warrant could be decreased, all without your approval.

Our Warrants are issued in registered form under the Warrant Agreement between the warrant agent and us. The Warrant Agreement provides that the terms of the Warrants may be amended without the consent of any holder to cure any ambiguity or correct any defective provision, but requires the approval by the holders of at least 50% of the then-outstanding Public Warrants to make any change that adversely affects the interests of the registered holders of Public Warrants. Accordingly, we may amend the terms of the Public Warrants in a manner adverse to a holder if holders of at least 50% of the then-outstanding Public Warrants approve of such amendment. Although our ability to amend the terms of the Public Warrants with the consent of at least 50% of the then-outstanding Public Warrants is unlimited, examples of such amendments could be amendments to, among other things, increase the exercise price of the Warrants, convert the Warrants into cash or stock (at a ratio different than initially provided), shorten the exercise period or decrease the number of shares of our Common Stock purchasable upon exercise of a Warrant.

We may redeem unexpired Warrants prior to their exercise at a time that is disadvantageous to warrant holders, thereby making such Warrants worthless.

We have the ability to redeem outstanding Warrants at any time after they become exercisable and prior to their expiration, at a price of \$0.01 per Warrant, provided that the last reported sales price of our Common Stock equals or exceeds \$18.00 per share (as adjusted for stock splits, stock dividends, reorganizations, recapitalizations and the like) for any 20 trading days within a 30 trading-day period ending on the third trading day prior to the date on which we give proper notice of such redemption and provided certain other conditions are met. If and when the Warrants become redeemable by us, we may exercise our redemption right even if we are unable to register or qualify the underlying securities for sale under all applicable state securities laws. Redemption of the outstanding Warrants could force you (a) to exercise your Warrants and pay the exercise price therefor at a time when it may be disadvantageous for you to do so, (b) to sell your Warrants at the then-current market price when you might otherwise wish to hold your Warrants or (c) to accept the nominal redemption price which, at the time the outstanding Warrants are called for redemption, is likely to be substantially less than the market value of your Warrants.

In addition, we may redeem your Warrants after they become exercisable for a number of shares of Common Stock determined based on the redemption date and the fair market value of our Common Stock. Any such redemption may have similar consequences to a cash redemption described above. In addition, such redemption may occur at a time when the Warrants are “out-of-the-money,” in which case, you would lose any potential embedded value from a subsequent increase in the value of our Common Stock had your Warrants remained outstanding.

We may issue additional shares of Common Stock or other equity securities without shareholder approval, which would dilute shareholder's ownership interests and may depress the market price of the Common Stock.

As of December 31, 2022 we have Warrants outstanding to purchase an aggregate of 35,476,627 shares of Common Stock. Pursuant to the Merger Agreement, we may issue up to 25,000,000 shares of our Common Stock as Earnout Shares. In addition, pursuant to the 2021 Plan and the ESPP, we may issue an aggregate of up to 27,846,011 shares of Common Stock, which amount is subject to increase from time to time. We may also issue additional shares of Common Stock or other equity securities of equal or senior rank in the future in connection with, among other things, future acquisitions or repayment of outstanding indebtedness, without stockholder approval, in a number of circumstances. The issuance of additional shares or other equity securities of equal or senior rank would have the following effects:

- existing stockholders' proportionate ownership interest in us will decrease;
- the amount of cash available per share, including for payment of dividends in the future, may decrease;
- the relative voting strength of each previously outstanding Common Stock may be diminished; and
- the market price of the Common Stock may decline.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our corporate headquarters, pilot-scale plant and research and development laboratories are located in West Sacramento, California, where we occupy approximately 41,443 square feet of office, plant and laboratory space. Our lease for this facility expires in October 31, 2028. We believe that the facility that it currently leases is adequate for its needs for the immediate future and that, should it be necessary, we can lease additional space to accommodate any future growth.

We also own a production facility in Sarnia, Ontario, Canada, Origin 1, that is currently under construction. This production facility is on approximately two acres of land and contains a construction trailer complete with approximately 24,126 square feet of office space. The land is owned and the offices are leased by our wholly owned subsidiary, Origin Materials Canada Pioneer Limited.

The Company completed the purchase of approximately 183 acres in Geismar, Louisiana for Origin 2 in third quarter 2022 in the amount of \$8.5 million. The Company is currently in the planning phase for the construction of Origin 2 at this property.

Item 3. Legal Proceedings

Not applicable.

Item 4. Mine Safety Disclosures

Not applicable.

Part II**Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities****Market Information**

Our Common Stock and Public Warrants are listed on NASDAQ under symbols “ORGN” and “ORGNW”, respectively. The following table sets forth the high and low sales price per share of our common stock as reported in the consolidated transaction reporting system.

Year Ended December 31, 2021	Sales Price	
	High	Low
6/25/21 - 6/30/21	\$ 10.28	\$ 8.20
Quarter ended 9/30/21	\$ 8.62	\$ 5.12
Quarter ended 12/31/21	\$ 8.05	\$ 5.67
Year Ended December 31, 2022		
Quarter ended 3/31/22	\$ 7.43	\$ 4.65
Quarter ended 6/30/22	\$ 7.71	\$ 4.87
Quarter ended 9/30/22	\$ 7.42	\$ 4.84
Quarter ended 12/31/22	\$ 5.95	\$ 4.19

Holders

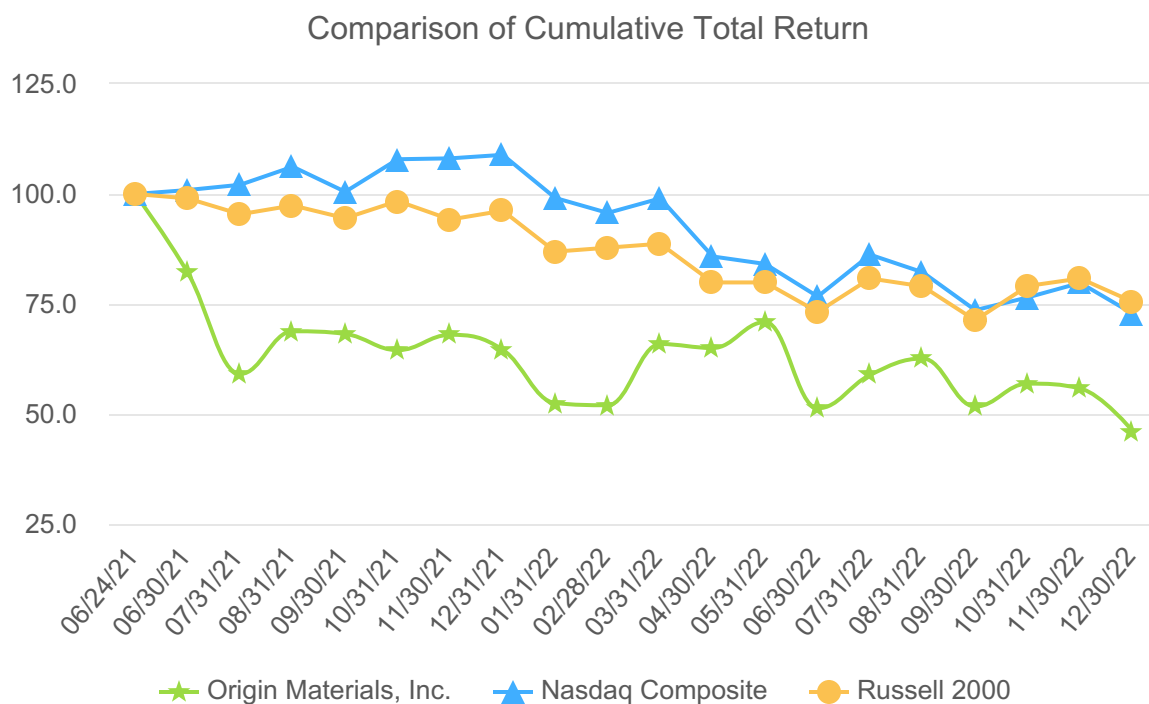
As of close of business on February 16, 2023, there were 43 holders of record of our Common Stock and 1 holder of record for our Public Warrants. The actual number of holders of our Common Stock and Public Warrants is greater than the number of record holders, and includes holders who are beneficial owners, but whose shares or warrants are held in street name by brokers or other nominees.

Dividend Policy

We have never declared or paid any dividends and do not anticipate paying any dividends on our common stock in the foreseeable future.

Performance Graph

The following graph compares the cumulative total shareholder returns on the Company’s common stock (trading symbol: ORGN) with the cumulative total returns on Nasdaq Composite and Russell 2000. The graph assumes that \$100 was invested on June 24, 2021 in each of the Company’s Common Stock, Nasdaq Composite and Russell 2000. The stock price performance on the following graph is not necessarily indicative of future stock price performance.



Securities Authorized for Issuance Under Equity Compensation Plans

Information about our equity compensation plans in Item 12 of Part III of this Annual Report is incorporated by reference to the information to be set forth in our Proxy Statement.

Recent Sales of Unregistered Equity Securities

None.

Issuer Purchases of Equity Securities

None.

Item 6. Reserved

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

On June 25, 2021, Artius Acquisition, Inc. consummated the Business Combination with Legacy Origin pursuant to the Merger Agreement. In connection with the closing of the Business Combination, Artius changed its name to Origin Materials, Inc. Legacy Origin was deemed to be the accounting acquirer in the Merger. While Artius was the legal acquirer in the Merger, because Legacy Origin was deemed the accounting acquirer, the historical consolidated financial statements of Legacy Origin became the historical consolidated financial statements of the combined company, upon the consummation of the Merger.

The following discussion and analysis should be read in conjunction with our consolidated financial statements and related notes appearing elsewhere in this Annual Report. This discussion may contain forward-looking statements based upon current expectations that involve risks and uncertainties. Our actual results may differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth in the sections titled "Cautionary Note Regarding Forward-Looking Statements" and "Risk Factors" as set forth elsewhere in this Annual Report. Unless the context otherwise requires, references in this section to "Legacy Origin", "Origin", "the Company", "we", "us" and "our" refer to the business and operations of Legacy Origin and its consolidated subsidiaries prior to the Business Combination and to Origin Materials, Inc. and its consolidated subsidiaries, following the Closing.

Overview

Origin is a carbon negative materials company with a mission to enable the world's transition to sustainable materials by replacing petroleum-based materials with decarbonized materials in a wide range of end products, such as food and beverage packaging, clothing, textiles, plastics, car parts, carpeting, tires, adhesives, soil amendments and more. We believe that our platform technology can help make the world's transition to "net zero" possible and support the fulfillment of greenhouse gas reduction pledges made by countries as part of the United Nations Paris Agreement as well as corporations that are committed to reducing emissions in their supply chains. Our technology can convert sustainable feedstocks such as sustainably harvested wood residues, agricultural waste, wood waste and even corrugated cardboard into materials and products that are currently made from fossil feedstocks such as petroleum and natural gas. These sustainable feedstocks are not used in food production, which differentiates our technology from other sustainable materials companies that use feedstocks such as vegetable oils or high fructose corn syrup and other sugars. While we have succeeded in producing small amounts of our products in the pilot plant for customer trials and testing purposes, we have not yet commenced large-scale production.

We believe that products made using Origin's platform technology can compete directly with petroleum-derived products on both performance and price. Due to abundant and renewable wood supplies that have historically stable pricing, our cost of production is expected to be more stable than potential competing platforms that use other types of feedstocks. We believe that end products made using our platform technology will have a significant unit cost advantage over products made from other low carbon feedstocks.

We have developed a proprietary platform technology to convert biomass, or plant-based carbon, into the versatile "building block" chemicals CMF and HTC, as well as other product intermediates. At a commercial scale, Origin's platform technology is expected to produce CMF and HTC with a negative carbon footprint. Origin believes these chemicals can replace petroleum-based counterparts, lowering the carbon footprint of a wide range of materials without sacrificing performance or cost.

The Company achieved the mechanical completion of its first manufacturing plan in Ontario, Canada ("Origin 1") and is currently in the process of commissioning the plant. The Company is also currently in the planning phase for the construction of a significantly larger manufacturing plant ("Origin 2").

Impact of the COVID-19 Pandemic

In March 2020, the COVID-19 outbreak was declared a pandemic by the World Health Organization. The pandemic has resulted in governments around the world implementing increasingly stringent measures to help control the spread of the virus, including quarantines, "shelter in place" and "stay at home" orders, travel restrictions, business curtailments, school closures and other measures. In addition, governments and central banks in several parts of the world have enacted fiscal and monetary stimulus measures to counteract the impacts of the COVID-19 pandemic.

We continue to monitor the rapidly evolving conditions and circumstances, as well as guidance from international and domestic authorities, including public health authorities, and we may need to take additional actions based on their recommendations. There is considerable uncertainty regarding the impact on our business stemming from current measures and potential future measures that could restrict access to our facilities, limit manufacturing and support operations and place restrictions on our workforce and suppliers.

The full extent to which the ongoing COVID-19 pandemic adversely affects our financial performance will depend on future developments, many of which are outside of our control, that are highly uncertain and cannot be predicted, including, but not limited to, the duration and spread of the pandemic, its severity, the effectiveness of actions to contain the virus (including the availability and effectiveness of vaccines) or treat its impact, and how quickly and to what extent normal economic and operating conditions can resume. The COVID-19 pandemic could also result in additional governmental restrictions and regulations, which could harm Origin's business and financial results. In addition, a recession, depression or other sustained adverse market impact resulting from COVID-19 could harm our business and its access to needed capital and liquidity. While the level of disruption caused by, and the economic impact of, COVID-19 has lessened in 2022, there is no assurance that the pandemic will not worsen again, included as a result of the emergence of new strains of the virus. Origin may continue to experience adverse impacts on its business and financial performance as a result of the global economic impact of the COVID-19 pandemic.

To the extent that the COVID-19 pandemic adversely affects our business, results of operations, financial condition or liquidity, it may also heighten other risks, such as the risk that, if the business impacts of COVID-19 carry on for an extended period, we may be required to recognize impairments for certain long-lived assets including amortizable intangible assets.

Key Factors and Trends Affecting Origin's Operating Results

We are a pre-revenue company. We believe that our performance and future success depend on several factors that present significant opportunities for us but also pose risks and challenges, including those discussed below and under "Risk Factors" appearing elsewhere in this Annual Report.

Basis of Presentation

We currently conduct our business through one operating segment. As a pre-revenue company with no commercial operations, our activities to date have been limited, and our historical results are reported under accounting principles generally accepted in the United States of America ("U.S. GAAP") and in U.S. Dollars. Upon commencement of commercial operations, we expect to expand our operations substantially, including in the United States and Canada, and as a result, we expect Origin's future results to be sensitive to foreign currency transaction and translation risks and other financial risks that are not reflected in Origin's historical financial statements. As a result, we expect that the financial results we report for periods after we begin commercial operations will not be comparable to the financial results included in this Annual Report.

Components of Results of Operations

We are a pre-revenue company and our historical results may not be indicative of our future results for reasons that may be difficult to anticipate. Accordingly, the drivers of our future financial results, as well as the components of such results, may not be comparable to our historical or projected results of operations.

Research and Development Expenses

To date, our research and development expenses have consisted primarily of development of key product intermediates including CMF, HTC, levulinic acid and furfural, and the conversion of those intermediates into products familiar to and desired by our customers, such as PX and PET. Our research and development expenses also include investments associated with the expansion of the Origin 1 plant and planning and construction of the Origin 2 plant, including the material and supplies to support product development and process engineering efforts.

General and Administrative Expenses

General and administrative expenses consist primarily of personnel-related costs, including stock-based compensation, professional fees, including, the costs of accounting, audit, legal, regulatory and tax compliance.

Additionally, costs related to advertising, trade shows, corporate marketing, as well as an allocated portion of our occupancy costs also comprise general and administrative expenses.

Change in Fair Value of Assumed Common Stock Warrants Liability

The change in fair value of assumed common stock warrants liability consists of the change in fair value of the Public Warrants and Private Placement Warrants assumed in connection with the Business Combination. We expect to incur an incremental income (expense) for the fair value adjustments for the outstanding assumed common stock warrants liability at the end of each reporting period or through the exercise of the warrants.

Change in Fair Value of Earnout Liability

The change in fair value of earnout liability consists of the change in fair value of the future contingent equity shares related to the Business Combination. We expect to recognize an incremental income (expense) for the fair value adjustments of the outstanding liability at the end of each reporting period.

Other Income (Expense)

Our other income (expense) consists of income from governmental grant programs, interest expense for stockholder convertible notes payable, interest income on marketable securities and income or expenses related to changes in the fair value of assumed common stock warrants liability, redeemable convertible preferred stock warrants, earnout liability, and derivative assets and liabilities. We expect to incur an incremental income (expense) for the fair value adjustments of these assets and liabilities at the end of each reporting period.

Income Tax Expense (Benefit)

Our income tax provision consists of an estimate for U.S. federal and state income taxes based on enacted rates, as adjusted for allowable credits, deductions, uncertain tax positions, changes in deferred tax assets and liabilities, and changes in the tax law. We maintain a valuation allowance against the full value of our U.S. and state net deferred tax assets because we believe the recoverability of the tax assets is not more likely than not.

Results of Operations

Comparison of the year ended December 31, 2022 and 2021

The following table summarizes the Company's results of operations with respect to the items set forth in such table for the year ended December 31, 2022 and 2021 together with the change in such items in dollars and as a percentage.

(in thousands)	Year Ended December 31,		Variance	Variance %
	2022	2021		
Operating expenses:				
Research and development	\$ 14,141	\$ 9,124	\$ 5,017	55 %
General and administrative expenses	24,095	17,265	6,830	40 %
Depreciation and amortization	711	544	167	31 %
Total operating expenses and loss from operations	38,947	26,933	12,014	45 %
Other (income) expenses:				
Interest income	(8,825)	(1,413)	(7,412)	525 %
Interest expense, net of capitalized interest	—	2,838	(2,838)	(100)%
Change in fair value of derivative liabilities	443	1,326	(883)	(67)%
Change in fair value of warrant liability	(21,988)	4,525	(26,513)	586 %
Change in fair value of earnout liability	(85,437)	(75,488)	(9,949)	13 %
Other income, net	(1,709)	(811)	(898)	111 %
Total other income, net	(117,516)	(69,023)	(48,493)	70 %
Net income	\$ 78,569	\$ 42,090	\$ 36,479	87 %

Research and Development Expenses

Research and development expenses increased \$5.0 million, or 55%, in 2022 compared to the same period in 2021. The increase was primarily related to increases of \$3.1 million in payroll due to increase staffing associated with the operation of the plants and stock-based compensation expense and \$1.7 million increase in overall R&D facilities expense.

General and Administrative Expenses

General and administrative expenses increased \$6.8 million, or 40%, in 2022 compared to the same period in 2021. This increase was primarily related to increases of \$4.6 million in professional fees related to legal, audit, and regulatory compliance, \$2.8 million in payroll cost due to increase staffing associated with the back office support of the plants, \$1.0 million in general facilities expense, \$0.8 million in insurance expense and \$0.5 million in travel expense, partially offset by \$3.0 million decrease in financing cost.

Interest income

Interest income increased \$7.4 million, or 525%, in 2022 compared to the same period in 2021. Interest income is generated from the Company's investments in marketable securities including money market funds, US treasuries, corporate bonds and miscellaneous other forms of investments. The increase was mainly due to the interest earned for the full year in 2022 compared with one quarter in 2021.

Interest expense, net of capitalized interest

Interest expense decreased \$2.8 million, or (100)%, in 2022 compared to the same period in 2021. The interest expense from 2021 was mainly due to the issuance of stockholder convertible notes with interest expense of \$0.4 million and \$2.2 million related debt issuance costs.

Change in fair value of derivative liabilities, warrant liability, and earnout liability

The Company recognized aggregate income on the change in the fair values of the derivative liabilities, the warrant liability, and the earnout liability of \$37.3 million in 2022 compared to the same period in 2021. The income from changes in fair value of earnout liability increased \$9.9 million as a result of subsequent changes in the fair value recorded in the Consolidated Statements of Operations and Comprehensive Income (Loss). The income from changes in fair value of warrant liability increased \$26.5 million is related to the Company's merger resulting in a significant decrease in the value of the warrants. The movement in these instruments' fair values are driven by the value of the Company's stock price. The fair value of \$0.4 million for the derivative liabilities is due to a \$0.8 million increase in fair value associated with our foreign exchange sales.

Other Income, net

Other income increased \$0.9 million, or 111%, in 2022 compared to the same period in 2021. This increase was primarily related to \$1.3 million in realized gain on sold marketable securities offset by \$0.2 million decrease in grant income.

Comparison of the Year Ended December 31, 2021 and 2020

See "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" of the Company's Form 10-K for the year ended December 31, 2021 for a discussion of changes in its results of operations from the year ended December 31, 2020 to the year ended December 31, 2021.

Non-GAAP Measures

To provide investors with additional information in connection with our results as determined in accordance with U.S. GAAP, we disclose Adjusted Earnings before Interest, Taxes, Depreciation, and Amortization ("Adjusted EBITDA") as a non-GAAP measure. Adjusted EBITDA is a key metric used by management and our Board of Directors (the "Board") to assess our financial performance. Adjusted EBITDA is also frequently used by analysts, investors, and other interested parties to evaluate companies in our industry, when considered alongside other U.S. GAAP measures. We use Adjusted EBITDA to supplement U.S. GAAP measures of performance to evaluate the effectiveness of our business strategies, make budgeting decisions and compare our performance against that of other companies using similar measures. This measure is not a financial measure calculated in accordance with U.S. GAAP, and it should not be considered as a substitute for net income, operating income, or any other measure calculated in accordance with U.S. GAAP, and may not be comparable to similarly titled measures reported by other companies.

Adjusted EBITDA

We believe that the presentation of Adjusted EBITDA is appropriate to provide additional information to investors about our operating profitability adjusted for certain non-cash items, non-routine items that we do not expect to continue at the same level in the future, as well as other items that are not core to our operations. Further, we believe Adjusted EBITDA provides a meaningful measure of operating profitability because we use it for evaluating our business performance, making budgeting decisions, and comparing our performance against that of other peer companies using similar measures.

We define Adjusted EBITDA as net income or loss adjusted for certain non-cash and non-recurring items, including (i) stock-based compensation expense, (ii) depreciation and amortization, (iii) interest income, (iv) interest expense, net of capitalized interest, (v) change in fair value of derivative liabilities, (vi) change in fair value of warrants liability, (vii) change in fair value of earnout liability, (viii) professional fees related to completed mergers, and (ix) other income, net.

(in thousands)	Year ended December 31,		
	2022	2021	2020
Net income (loss)	\$ 78,569	\$ 42,090	\$ (30,302)
Stock based compensation	7,235	5,767	1,630
Depreciation and amortization	711	544	479
Interest income	(8,825)	(1,413)	—
Interest expense, net of capitalized interest	—	2,838	341
Change in fair value of derivative	443	1,326	1,088
Change in fair value of warrants liability	(21,988)	4,525	18,498
Change in fair value of earnout liability	(85,437)	(75,488)	—
Professional fees related to completed mergers	—	640	—
Other income, net	(1,709)	(811)	(805)
Adjusted EBITDA	<u>\$ (31,001)</u>	<u>\$ (19,982)</u>	<u>\$ (9,071)</u>

Liquidity and Capital Resources

Sources of Liquidity

Since inception, we have financed our operations principally from the sales and issuances of redeemable preferred stock, common stock, and convertible notes, and governmental grant programs. In addition, the Business combination has provided substantial liquidity to the Company. Origin had \$323.8 million and \$444.6 million in cash, cash equivalents, restricted cash, and marketable securities as of December 31, 2022 and December 31, 2021, respectively. Our cash equivalents are invested primarily in U.S. Treasury money market funds and our marketable securities are primarily U.S. Treasury notes and bonds, corporate bonds, asset-back securities, foreign government and agency securities, and municipal bonds.

We have not yet generated any revenue from our business operations. Our ability to successfully develop the products, commence commercial operations and expand the business will depend on many factors, including our ability to meet the working capital needs, the availability of equity or debt financing and, over time, our ability to generate cash flows from operations.

We will require a significant amount of cash for capital expenditures as we invest in the construction of Origin 1 and Origin 2 plants, and additional research and development. In addition to our cash on hand following the Business Combination, we anticipate that we will need substantial additional project financing and government incentives to meet our financial projections, execute our growth strategy and expand our manufacturing capability, including to finance the construction of the Origin 1 and Origin 2 plants. Our ability to obtain financing for the construction of future plants may depend in part on our ability to first enter into customer agreements sufficient to demonstrate sufficient demand to justify the construction of such plants. We may also raise additional capital through equity offerings or debt financings, as well as through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties. Our future capital requirements will depend on many factors, including actual construction costs of the Origin 1 and Origin 2 plants, changes in the costs in our supply chain, expanded operating activities and our ability to secure customers. If our financial projections are inaccurate, we may need to seek additional equity or debt financing from outside sources, which may not be available on acceptable terms, if at all. If we are unable to raise additional capital when required, our business, financial condition and results of operations would be harmed.

We expect to continue to incur operating losses in the near term as our operating and capital expenses will increase to support the growth of the business. We expect that our general and administrative expenses and research and development expenses will continue to increase as we increase our sales and marketing activities, develop our distribution infrastructure, support our growing operations and operate as a public company.

Indebtedness

In November 2019, Legacy Origin entered into secured convertible note agreements (the “2019 Notes”) with certain Legacy Origin preferred stockholders, whereby Legacy Origin could borrow up to \$6.0 million in aggregate from the noteholders. The 2019 Notes had an annual interest rate of 10% and an original maturity date of September 30, 2021. All principal and accrued interest under the 2019 Notes were converted into shares of Legacy Origin Common Stock immediately prior to the closing of the Business Combination.

In April 2020, Legacy Origin received an unsecured loan in the amount of \$0.9 million under the Paycheck Protection Program (the “PPP Loan”). The Paycheck Protection Program was established under the CARES Act and is administered by the U.S. Small Business Administration. The PPP Loan had a two-year term and bore interest at a rate of 1.0% per annum. This loan was repaid on June 24, 2021.

As of December 31, 2022 and 2021, we have \$7.2 million and \$6.8 million of indebtedness under a Canadian government program, respectively, of which \$0.8 million and \$0.5 million was received during the year ended December 31, 2022 and December 31, 2021, respectively. Additionally, as of December 31, 2022, we had liability balances consisting of a \$5.4 million legacy related party liability with accrued interest, a \$5.8 million stockholder note with accrued interest, and a \$2.5 million customer prepayments. As of December 31, 2021, we had liability balances consisting of a \$5.7 million legacy related party liability with accrued interest, a \$5.2 million stockholder note with accrued interest, and a \$2.5 million customer prepayment.

In February 2021, Legacy Origin issued and sold convertible promissory notes with an aggregate principal amount of \$10.0 million and an interest rate of 8.0% per annum (the “2021 Notes”). The 2021 Notes had an original maturity date on September 30, 2021. All principal and accrued interest on the 2021 Notes were converted into shares of Legacy Origin Common Stock immediately prior to the closing of the Business Combination.

In November 2016, Legacy Origin received a \$5.0 million prepayment from a legacy stockholder for product from Origin 1 pursuant to an Offtake Agreement. The prepayment was to be credited against the purchase of products over the term of the agreement. The prepayment was secured by a promissory note to be repaid in cash in the event that the prepayment could not be credited against the purchase of product, for example, if Origin 1 were never constructed. The promissory note was collateralized substantially by Origin 1 and other assets of Origin Materials Canada Pioneer Limited. In May 2019, Legacy Origin and the legacy stockholder amended the Offtake Agreement and promissory note. The amendment added accrued interest of \$0.2 million to the principal balance of the prepayment and provided for the prepayment amount to be repaid in three annual installments rather than being applied against the purchase of product from Origin 1. On August 1, 2022, Legacy Origin and the legacy stockholder amended the note to provide for repayment in three installments consisting of \$2.7 million on September 1, 2024, \$1.9 million on September 1, 2025, and \$1.8 million on September 1, 2026 and to allow the legacy stockholder to offset amounts owed for the purchase of product from Legacy Origin's Origin 1 facility against amounts due under the note. At December 31, 2022 and 2021, the total aggregate principal amount of debt outstanding was \$5.2 million and \$5.2 million, respectively, and accrued interest totaled \$0.6 million and \$0.5 million, respectively.

Prepayments

In November 2016, Legacy Origin received a \$5.0 million prepayment from a legacy stockholder for product from Origin 1 pursuant to an Offtake Agreement. The prepayment is to be credited against the purchase of products from Origin 1 over the term of the Offtake Agreement. Specifically, repayment is effected by applying a credit to product purchases each month over the first five years of operation of Origin 1 up to \$7.5 million, which is equal to 150% of the prepayment amount. If product purchases are not sufficient to recover the advances, the application of the credit to purchases as payment of the advances will continue until fully repaid. The prepayment is secured by a note to be repaid in cash in the event the prepayment cannot be credited against the purchase of product, for example, if Origin 1 is never constructed. The note is collateralized substantially by Origin 1 and other assets of Origin Materials Canada Pioneer Limited. If repaid in cash, the note bears an annual interest rate of the three-month London Interbank Offered Rate (“LIBOR”) plus 0.25% (5.02% at December 31, 2022) and matures five years from the commercial operation date of Origin 1. At December 31, 2022 and December 31, 2021 the total note principal outstanding was \$5.1 million plus accrued interest of \$0.3 million and \$0.1 million, respectively.

In September 2019, Legacy Origin entered into a \$5.0 million prepayment agreement with a counterparty for the purchase of products from Origin 2. The prepayment is to be made in two equal installments: the first \$2.5 million was in October 2019 and the remaining \$2.5 million is due within 30 days of the customer confirming that a sample from Origin 1 meets the customer's specifications. Origin and the customer agreed to work in good faith to execute an Offtake Agreement, the agreed terms of which are set forth in the prepayment agreement, whereby 100% of the prepayment will be applied against future purchases. The prepayment agreement provides the customer a capacity reservation of up to a specified annual volume of product from Origin 1 for a term of ten years, pursuant to the terms of an Offtake Agreement. At December 31, 2022 and 2021, the total amount outstanding on this agreement was \$2.5 million.

Cash Flows for the year ended December 31, 2022 Compared to the Year Ended December 31, 2021

The following table shows a summary of cash flows for the year ended December 31, 2022 and 2021:

	Year ended December 31,	
	2022	2021
Net cash used in operating activities	\$ (26,092)	\$ (22,043)
Net cash provided by (used in) investing activities	88,847	(411,638)
Net cash provided by financing activities	1,248	478,948
Effects of foreign exchange rate changes on the balance of cash and cash equivalents, and restricted cash held in foreign currencies	(2,782)	(14)
Net increase in cash	<u>\$ 61,221</u>	<u>\$ 45,253</u>

Cash Used in Operating Activities

Net cash used in operating activities was \$26.1 million for the year ended December 31, 2022, compared to net cash used in operating activities of \$22.0 million over the same period in 2021. The increase in cash used in operating activities was primarily attributable to the deposit made of an approximately \$5.0 million during third quarter 2022 towards securing a license to technologies that can be used to produce high margin downstream products using our intermediate products as feedstock.

Cash Provided by (Used in) Investing Activities

Net cash provided by investing activities was \$88.8 million for the year ended December 31, 2022, compared to net cash used in investing activities of \$411.6 million over the same period in 2021. Our cash flows from investing activities, to date, have been comprised of purchases of property and equipment, purchase of intangible asset, and purchases and maturities of our marketable securities. We expect the costs to acquire property, plant and equipment to increase substantially in the near future as we fully build out Origin 1 as well as acquire the property, plant and equipment for Origin 2. The change was primarily related to the maturities of marketable securities of \$180.3 million in 2022, compared to \$25.1 million for the same period in 2021. In addition to the net purchases of marketable securities of \$7.5 million in 2022, compared to net purchases of \$424.2 million for the same period in 2021. The cash provided was partially offset by cash used to purchase property, plant and equipment of \$83.7 million during 2022 which included \$8.5 million paid during the third quarter 2022 to complete the purchase of the land in Geismar, Louisiana for Origin 2, compared to \$12.3 million used for the same period in 2021.

The Company continues to increase activity related to the construction of Origin 1 and Origin 2, which is the main driver of the variation in cash used in investing activities between the two periods.

Cash Provided by Financing Activities

Net cash provided by financing activities was \$1.2 million for the year ended December 31, 2022, compared to net cash provided by financing activities of \$478.9 million over the same period in 2021. The cash provided by financing activities during 2021 was primarily related to funds generated from business combination, net of issuance costs, of \$467.5 million.

Cash Flows for the Year Ended December 31, 2021 Compared to the Year Ended December 31, 2020

See "Item 7. Management's Discussion and Analysis of Financial Condition and Liquidity and Capital Resources" of the Company's Form 10-K for the year ended December 31, 2021 for a discussion of changes in its cash flows from the year ended December 31, 2020 to the year ended December 31, 2021.

Material Cash Requirements from Known Contractual and Other Obligations

Our material cash requirements from known contractual and other obligations as of December 31, 2022, consisted of:

- The total cost of Origin 1, our initial plant, in the process of commissioning in Sarnia, Ontario, Canada and Origin 2, which is currently in the front end engineering and design phase. These costs, plus the ongoing operating loss of the Company is expected to be funded through a combination of Company cash and marketable securities in addition to substantial project financing and government incentives. We also expect to secure funding for plant construction under potential collaborations, strategic alliances or marketing, distribution or licensing arrangements which have not yet been secured, until such time as Origin 2 is operational.
- Operating lease liabilities that are included in our consolidated balance sheets consists of future non-cancelable minimum rental payments under operating leases for our office space, research and development space, and leases of various office equipment, warehouse space, and temporary fencing. The short-term lease liabilities of \$1.7 million will mature in the next three years and the remaining \$1.4 million were related to long-term. For additional information regarding our lease liabilities, see Note 18 to the consolidated financial statements in Item 8 of this Annual Report.
- In the near-term, the Company also expect to make payments related to the repayment agreement associated with the legacy stockholder note. The repayment in the amount of \$2.7 million is due on September 1, 2024, \$1.9 million is due on September 1, 2025, and \$1.8 million is due on September 1, 2026 (inclusive of accrued but unpaid interest). However, the prepayment could be used to credit against the purchase of products over the term of the Offtake Agreement. For additional information regarding this repayment, see Note 11- Related Party Transactions to the consolidated financial statements in Item 8 of this Annual Report.
- Furthermore, the Company has a prepayment agreement with a counterparty with \$2.5 million due within 30 days of the customer confirming that a sample from origin 1 meets the customer's specifications. The amount due could be used to apply against future purchases. For additional information regarding this repayment, see Note 12- Other Liabilities, Long-term to the consolidated financial statements in Item 8 of this Annual Report.

Critical Accounting Policies and Estimates

Our financial statements have been prepared in accordance with U.S. GAAP. In the preparation of these consolidated financial statements, we are required to use judgment in making estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities as of the date of the financial statements, as well as the reported expenses incurred during the reporting periods. On an ongoing basis, we evaluate our estimates and assumptions. Our actual results may differ from these estimates under different assumptions or conditions.

We consider an accounting judgment, estimate or assumption to be critical when (1) the estimate or assumption is complex in nature or requires a high degree of judgment and (2) the use of different judgments, estimates and assumptions could have a material impact on the consolidated financial statements. Our significant accounting policies are described in Note 3 to our consolidated financial statements included elsewhere in this Annual Report. We have the critical accounting policies and estimates which are described below.

Stock-Based Compensation

Origin may grant a wide variety of equity securities under various stock incentive plans, including incentive stock options, nonstatutory stock options, stock appreciation rights, restricted stock awards, RSU awards, performance stock awards, and other awards. At December 31, 2022, the Company has granted incentive stock options, RSU awards, and performance awards. Origin measures stock options and other stock-based awards granted to employees, directors and other service providers based on their fair value on the date of grant and recognizes compensation expenses of those awards over the requisite service period, net of estimated forfeitures, which is generally the vesting period of the respective award. For awards with performance conditions, compensation is recorded once there is sufficient objective evidence the performance conditions are considered probable of being met. The estimated number of stock awards that will ultimately vest requires judgement, and to the extent actual results or updated estimates differ from our current estimates, such amounts will be recorded as a cumulative adjustment in the period estimates are revised. Origin applies the straight-line method of expense recognition to all awards with only service-based vesting conditions. Origin estimates the fair value of each stock option grant on the date of grant using the Black-Scholes option-pricing model and the grant date closing stock price for RSU awards and performance awards. The Black-Scholes option-pricing model requires the use of highly subjective assumptions including:

- *Expected Term*—Origin have opted to use the “simplified method” for estimating the expected term of plain-vanilla options, whereby the expected term equals the arithmetic average of the vesting term and the original contractual term of the option (generally 10 years).
- *Risk-Free Interest Rate*—The risk-free rate assumption is based on the U.S. Treasury zero-coupon instruments with maturities similar to the expected term of Origin’s stock options.
- *Expected Dividend*—Origin has not issued any dividends and does not anticipate issuing dividends on Origin’s common stock. As a result, Origin has estimated the dividend yield to be zero.
- *Forfeiture*— The Company estimates forfeitures based on historical activity and considers voluntary and involuntary termination behavior as well as analysis of actual historical option forfeitures, netting the estimated expense by the derived forfeiture rate.
- *Expected Volatility*—Due to Origin’s limited operating history and a lack of company-specific historical and implied volatility data, Origin has based its estimate of expected volatility on the historical volatility of a group of similar companies that are publicly traded. The historical volatility data was computed using the daily closing prices for the various companies’ shares during the equivalent period of the calculated expected term of the stock-based awards.

Warrant Liability

We account for the Warrants in accordance with the guidance contained in ASC 815-40-15-7D and 7F under which the Warrants do not meet the criteria for equity treatment and must be recorded as liabilities. Accordingly, we classify the Warrants as liabilities at their fair value and adjust the Warrants to fair value at each reporting period. This liability is subject to re-measurement at each balance sheet date until exercised, and any change in fair value is recognized in our statement of operations. The quoted market price was used for both Private Warrants and Public Warrants as the fair value for the periods presented.

Earnout Liability

The Company has recorded an earnout liability related to future contingent equity shares related to the Business Combination (Note 13). The Company recorded these instruments as liabilities on the consolidated balance sheet at fair value, with subsequent changes in their respective fair values recognized in earnings at each reporting date. The determination of the fair value involves certain judgments and estimates. These judgments include, but are not limited to, the probability of achievement of the market conditions, expected volatility of the Company's common stock, and the appropriate discount rate.

Investments in Marketable Debt Securities, Available-for-Sale

We maintain a portfolio of investments in a variety of fixed and variable rate debt securities, including U.S. treasuries, U.S. government sponsored entities, corporate debt, asset-backed securities and other. We consider our investments in marketable debt securities to be available-for-sale, and accordingly, are recorded at their fair values. We determine the appropriate classification of investments in marketable debt securities at the time of purchase. Interest along with amortization of purchase premiums and accretion of discounts from the purchase date through the estimated maturity date, including consideration of variable maturities and contractual call provisions, are included in other income (expense), net in the consolidated statements of operations. At December 31, 2022 and 2021 the fair value of marketable securities was estimated to be \$215.5 million and \$397.5 million, respectively. See Note 6 - "Fair Value Measurements" of our Notes to the Consolidated Financial Statements for additional information. We typically invest in highly-rated debt securities, and our investment policy generally limits the amount of credit exposure to any one issuer. The policy requires substantially all investments to be investment grade, with the primary objective of minimizing the potential risk of principal loss.

We regularly review our available-for-sale marketable securities in an unrealized loss position and evaluate the current expected credit loss by considering factors such as historical experience, market data, issuer-specific factors, and current economic conditions. The unrealized losses as of December 31, 2022 were attributable to changes in interest rates that impacted the value of the investments, and not related to increased credit risk. Accordingly, we have not recorded an allowance for credit losses associated with these investments. Declines in the fair value of our investments judged to be other than temporary could adversely affect our future operating results.

Recent Accounting Pronouncements

See Note 5 to the consolidated financial statements in this Annual Report for more information about recent accounting pronouncements, the timing of their adoption, and our, to the extent it has made one, of their potential impact on our financial condition and its results of operations and cash flows.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to a variety of market and other risks, including the effects of changes in interest rates, inflation and foreign currency translation and transaction risks, as well as risks to the availability of funding sources, hazard events and specific asset risks.

Interest Rate Risk

The market interest risk in our financial instruments and our financial positions represents the potential loss arising from adverse changes in interest rates. As of December 31, 2022 and 2021, we had cash and cash equivalents and marketable securities of \$323.8 million and \$444.6 million, respectively, consisting of interest-bearing money market accounts and marketable securities, for which the fair market value would be affected by changes in the general level of U.S. interest rates. However, due to the short-term maturities and the low-risk profile of our investments, an immediate 10% change in the interest rate would not have a material effect on the fair market value of our cash and cash equivalents and marketable securities.

Foreign Currency Risk

Our functional currency is the U.S. dollar, while our Canadian subsidiaries' functional currency is the Canadian dollar. This can expose us to both currency transaction and translation risk. To date, we have not had material exposure to foreign currency fluctuations and have not hedged such exposure, although we may do so in the future.

Certain marketable debt securities may be denominated in foreign currencies. At December 31, 2022, we had marketable debt securities denominated in U.S. dollar, Australian dollar, and British pound sterling. We pursue our objective of limiting foreign currency exposure by utilizing foreign currency forward contracts to offset foreign exchange risk. Our foreign currency forward contracts are generally short-term in duration. We neither use these foreign currency forward contracts for trading purposes nor do we currently designate these forward contracts as hedging instruments pursuant to Accounting Standards Codification Topic 815, *Derivatives and Hedging*. Accordingly, we record the fair values of these contracts as of the end of our reporting period to our consolidated balance sheets with changes in fair values recorded to our consolidated statements of operations. Given the short duration of the forward contracts, the amount recorded is not significant. Our ultimate realized gain or loss with respect to foreign currency exposures will generally depend on the size and type of cross-currency transactions that we enter into, the currency exchange rates associated with these exposures and changes in those rates, the net realized gain or loss on our foreign currency forward contracts and other factors.

Inflation Risk

Inflation rates continue to have an effect on worldwide economies. Inflation generally affects us by increasing our cost of labor and may also increase transportation and construction costs due, for example, to higher fuel prices. We believe that inflation has not had a material effect on our audited consolidated financial statements included in Part II, Item 8 of this Annual Report on Form 10-K.

Item 8. Financial Statements

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Origin Materials, Inc.

Opinion on the financial statements

We have audited the accompanying consolidated balance sheets of Origin Materials, Inc. (a Delaware corporation) and subsidiaries (the “Company”) as of December 31, 2022 and 2021, the related consolidated statements of operations and comprehensive income (loss), redeemable convertible preferred stock, stockholders’ equity and accumulated other comprehensive income (loss), and cash flows for each of the three years in the period ended December 31, 2022, and the related notes (collectively referred to as the “financial statements”). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (“PCAOB”), the Company’s internal control over financial reporting as of December 31, 2022, based on criteria established in the 2013 *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”), and our report dated February 23, 2023 expressed an unqualified opinion.

Basis for opinion

These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical audit matters

Critical audit matters are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. We determined that there are no critical audit matters.

/s/ GRANT THORNTON LLP

We have served as the Company’s auditor since 2020.

San Jose, California
February 23, 2023

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Origin Materials, Inc.

Opinion on internal control over financial reporting

We have audited the internal control over financial reporting of Origin Materials, Inc. (a Delaware corporation) and subsidiaries (the “Company”) as of December 31, 2022, based on criteria established in the 2013 *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022, based on criteria established in the 2013 *Internal Control—Integrated Framework* issued by COSO.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (“PCAOB”), the consolidated financial statements of the Company as of and for the year ended December 31, 2022, and our report dated February 23, 2023 expressed an unqualified opinion on those financial statements.

Basis for opinion

The Company’s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company’s internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

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

Definition and limitations of internal control over financial reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company’s assets that could have a material effect on the financial statements.

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

/s/ GRANT THORNTON LLP

San Jose, California
February 23, 2023

ORIGIN MATERIALS, INC.
CONSOLIDATED BALANCE SHEETS

(In thousands, except share and per share data)	December 31, 2022	December 31, 2021
ASSETS		
Current assets		
Cash and cash equivalents	\$ 107,858	\$ 46,637
Restricted cash	490	490
Marketable securities	215,464	397,458
Other receivables	4,346	2,612
Derivative asset	—	202
Prepaid expenses and other current assets	3,341	3,774
Total current assets	331,499	451,173
Property, plant, and equipment, net	154,183	57,185
Operating lease right-of-use asset	2,779	1,782
Intangible assets, net	160	215
Other long-term assets	5,079	62
Total assets	\$ 493,700	\$ 510,417
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities		
Accounts payable	\$ 10,384	\$ 2,451
Accrued expenses	8,414	973
Operating lease liability, current	619	280
Other liabilities, current	51	380
Derivative liability	344	103
Total current liabilities	19,812	4,187
Earnout liability	42,533	127,757
Canadian government research and development program liability	7,185	6,762
Assumed common stock warrants liability	30,872	52,860
Stockholder note	5,847	5,189
Related party other liabilities, long-term	5,395	5,720
Operating lease liability	2,249	1,486
Other liabilities, long-term	2,902	2,946
Total liabilities	\$ 116,795	\$ 206,907
Commitments and contingencies (See Note 19)		
STOCKHOLDERS' EQUITY		
Preferred stock, \$0.0001 par value, 10,000,000 shares authorized; no shares issued and outstanding as of December 31, 2022 and 2021	\$ —	\$ —
Common stock, \$0.0001 par value, 1,000,000,000 shares authorized; 143,034,225 and 141,301,569, issued and outstanding as of December 31, 2022 and 2021, respectively (including 4,500,000 Sponsor Vesting Shares)	14	16
Additional paid-in capital	371,072	361,542
Retained earnings (Accumulated deficit)	21,772	(56,797)
Accumulated other comprehensive loss	(15,953)	(1,251)
Total stockholders' equity	376,905	303,510
Total liabilities and stockholders' equity	\$ 493,700	\$ 510,417

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

ORIGIN MATERIALS, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE INCOME (LOSS)

(In thousands, except share and per share data)	Year Ended December 31,		
	2022	2021	2020
Operating expenses			
Research and development	\$ 14,141	\$ 9,124	\$ 4,138
General and administrative	24,095	17,265	6,563
Depreciation and amortization	711	544	479
Total operating expenses and loss from operations	38,947	26,933	11,180
Other (income) expenses			
Interest income	(8,825)	(1,413)	—
Interest expense, net of capitalized interest	—	2,838	341
Change in fair value of derivatives	443	1,326	1,088
Change in fair value of warrants liability	(21,988)	4,525	18,498
Change in fair value of earnout liability	(85,437)	(75,488)	—
Other income, net	(1,709)	(811)	(805)
Total other (income) expenses, net	(117,516)	(69,023)	19,122
Net income (loss)	\$ 78,569	\$ 42,090	\$ (30,302)
Other comprehensive income (loss)			
Unrealized loss on marketable securities	\$ (8,014)	\$ (1,712)	\$ —
Foreign currency translation adjustment, net of tax	(6,688)	77	794
Total comprehensive income (loss)	\$ 63,867	\$ 40,455	\$ (29,508)
Net income (loss) per share, basic	\$ 0.57	\$ 0.42	\$ (0.48)
Net income (loss) per share, diluted	\$ 0.55	\$ 0.40	\$ (0.48)
Weighted-average common shares outstanding, basic	137,563,877	101,221,781	62,544,933
Weighted-average common shares outstanding, diluted	142,146,767	106,237,754	62,544,933

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

ORIGIN MATERIALS, INC.
CONSOLIDATED STATEMENTS OF REDEEMABLE CONVERTIBLE PREFERRED STOCK,
STOCKHOLDERS' EQUITY AND ACCUMULATED OTHER COMPREHENSIVE INCOME (LOSS)
(In Thousands, Except Share Amounts)

	Redeemable Convertible Preferred Stock						Common Stock		Common Stock		Additional Paid-in Capital	(Accumulated Deficit) Retained Earnings	Accumulated Other Comprehensive Income (loss)	Total Stockholders' Equity
	Series A		Series B		Series C									
	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount				
Balance at December 31, 2019 (as previously reported)	13,204,284	\$ 31,478	6,275,704	\$ 41,125	1,590,675	\$ 23,380	1,283,788	\$ —	—	\$ —	\$ 1,011	\$ (68,585)	\$ (410)	\$ (67,984)
Retrospective application of the recapitalization due to the Business Combination (Note 4)	(13,204,284)	(31,478)	(6,275,704)	(41,125)	(1,590,675)	(23,380)	(1,283,788)	—	62,542,363	6	95,977	—	—	95,983
Balance at December 31, 2019, effect of Business Combination (Note 4)	—	—	—	—	—	—	—	—	62,542,363	6	96,988	(68,585)	(410)	27,999
Common stock issued upon exercise of stock options	—	—	—	—	—	—	—	—	2,912	—	2	—	—	2
Stock-based compensation	—	—	—	—	—	—	—	—	—	—	1,630	—	—	1,630
Net loss	—	—	—	—	—	—	—	—	—	—	—	(30,302)	—	(30,302)
Other comprehensive income	—	—	—	—	—	—	—	—	—	—	—	—	794	794
Balance at December 31, 2020	—	—	—	—	—	—	—	—	62,545,275	\$ 6	\$ 98,620	\$ (98,887)	\$ 384	\$ 123
Reclassification of stockholders' convertible notes payable	—	—	—	—	—	—	—	—	2,049,191	—	20,491	—	—	20,491
Reclassification of redeemable convertible preferred stock warrant liability	—	—	—	—	—	—	—	—	5,554,440	7	54,267	—	—	54,274
Business Combination, net of redemptions and equity issuance costs of \$37 million	—	—	—	—	—	—	—	—	70,981,545	—	385,405	—	—	385,405
Reclassification of equity to liability related to earn out provisions of Business Combination (see note 13)	—	—	—	—	—	—	—	—	—	—	(203,082)	—	—	(203,082)
Common stock issued upon exercise of stock options	—	—	—	—	—	—	—	—	171,118	3	74	—	—	77
Stock-based compensation	—	—	—	—	—	—	—	—	—	—	5,767	—	—	5,767
Net income	—	—	—	—	—	—	—	—	—	—	—	42,090	—	42,090
Other comprehensive loss	—	—	—	—	—	—	—	—	—	—	—	—	(1,635)	(1,635)
Balance at December 31, 2021	—	—	—	—	—	—	—	—	141,301,569	\$ 16	\$ 361,542	\$ (56,797)	\$ (1,251)	\$ 303,510

Common stock issued upon exercise of stock options	—	—	—	—	—	—	—	—	—	1,412,226	—	401	—	—	401
Immediately vested common stock awards	—	—	—	—	—	—	—	—	—	320,430	(2)	—	—	—	(2)
Stock-based compensation	—	—	—	—	—	—	—	—	—	—	9,129	—	—	—	9,129
Net income	—	—	—	—	—	—	—	—	—	—	—	—	78,569	—	78,569
Other comprehensive loss	—	—	—	—	—	—	—	—	—	—	—	—	—	(14,702)	(14,702)
Balance at December 31, 2022	—	\$ —	—	\$ —	—	\$ —	—	\$ —	—	\$ —	143,034,225	\$ 14	\$ 371,072	\$ 21,772	\$ (15,953) \$ 376,905

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

ORIGIN MATERIALS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)	Year Ended December 31,		
	2022	2021	2020
Cash flows from operating activities			
Net income (loss)	\$ 78,569	\$ 42,090	\$ (30,302)
Adjustments to reconcile net income (loss) to net cash from operating activities:			
Depreciation and amortization	711	544	479
Amortization on right-of-use asset	582	280	—
Stock-based compensation	7,235	5,767	1,630
Amortization of debt issuance costs	—	14	90
Accretion of debt discount	—	2,211	101
Change in fair value of derivative	443	1,326	1,088
Change in fair value of common stock warrants liability	(21,988)	(30,510)	—
Change in fair value of preferred stock warrants liability	—	35,035	18,498
Change in fair value of earnout liability	(85,437)	(75,488)	—
Changes in operating assets and liabilities:			
Other receivables	(1,734)	(2,563)	1,007
Grants receivable	—	—	87
Prepaid expenses and other current assets	432	(3,652)	53
Other long-term assets	(5,017)	—	—
Accounts payable	26	(395)	1,203
Accrued expenses	485	3,010	349
Payment on operating lease liabilities	(572)	(295)	—
Other liabilities, current	(329)	380	—
Other liabilities, long-term	502	203	256
Net cash used in operating activities	(26,092)	(22,043)	(5,461)
Cash flows from investing activities			
Purchases of property, plant, and equipment, net of grants	(83,691)	(12,268)	(1,786)
Purchases of marketable securities	(3,823,407)	(2,448,316)	—
Sales of marketable securities	3,815,859	2,024,089	—
Maturities of marketable securities	180,331	25,058	—
Capitalized interest on plant construction	(245)	(201)	(268)
Net cash provided by (used in) investing activities	88,847	(411,638)	(2,054)
Cash flows from financing activities			
Proceeds from stockholders' notes payable, net of debt issuance costs	—	11,707	3,166
Payment of short-term debt	—	(906)	—
Proceeds from Canadian Government Research and Development Program	849	543	2,662
Proceeds from exercise of stock options	399	74	1
Business combination, net of issuance costs paid	—	467,530	—
Net cash provided by financing activities	1,248	478,948	5,829
Effects of foreign exchange rate changes on the balance of cash and cash equivalents, and restricted cash held in foreign currencies	(2,782)	(14)	(52)
Net increase (decrease) in cash and cash equivalents, and restricted cash	61,221	45,253	(1,738)
Cash and cash equivalents, and restricted cash, beginning of the period	47,127	1,874	3,612
Cash and cash equivalents, and restricted cash, end of the period	\$ 108,348	\$ 47,127	\$ 1,874
Supplemental disclosure of cash flow information			

Conversion of stockholder convertible notes payable to common stock	\$ —	\$ 20,493	\$ —
Reclassification of redeemable convertible preferred stock warrants to common stock	\$ —	\$ 54,267	\$ —
Reclassification of contingently issued equity to liability	\$ —	\$ 203,082	\$ —
Net assets assumed from business combination	\$ —	\$ 81,364	\$ —
Debt discount related to derivative liability	\$ —	\$ 2,196	\$ —
Business combination transaction costs, accrued but not paid	\$ —	\$ 609	\$ —
Operating lease right-of-use assets obtained in exchange for lease obligations	\$ 1,687	\$ 2,062	\$ —
Stock-based compensation capitalized into property, plant, and equipment	\$ 1,894	\$ —	\$ —
Purchases of fixed assets included in accounts payable and accrued expenses	\$ 17,085	\$ —	\$ —

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

ORIGIN MATERIALS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Organization and Business

Unless the context otherwise requires, references in these notes to “Origin”, “the Company”, “we”, “us” and “our” and any related terms are intended to mean the post-Business Combination Origin Materials, Inc. and its consolidated subsidiaries.

The Company’s mission is to help enable the world’s transition to sustainable materials by replacing petroleum-based materials with decarbonized materials in a wide range of end products, such as food and beverage packaging, clothing, textiles, plastics, car parts, carpeting, tires, adhesives, soil amendments and more. The Company’s technology can convert sustainable feedstocks, such as sustainably harvested wood, agricultural waste, wood waste and corrugated cardboard, into materials and products that are currently made from fossil feedstocks, such as petroleum and natural gas. The Company’s products are intended to compete directly with petroleum-derived products on both performance and price, as well as provide a significant unit cost advantage over products made from other low-carbon feedstocks.

The Company achieved the mechanical completion of its first manufacturing plant in Ontario, Canada (“Origin 1”) and is currently in the process of commissioning the plant. The Company is also currently in the planning phase for the construction of a significantly larger manufacturing plant (“Origin 2”).

On June 25, 2021 (the “Closing Date”), Artius Acquisition Inc. (“Artius”), a special purpose acquisition company, consummated the Merger Agreement and other Related Agreements (the “Merger Agreement”) dated February 16, 2021, by and among Artius, Zero Carbon Merger Sub Inc., a Delaware corporation and a wholly owned subsidiary of Artius (“Merger Sub”), and Micromidas, Inc. a Delaware corporation (now known as Origin Materials Operating Inc., (“Legacy Origin”).

Pursuant to the terms of the Merger Agreement, a business combination between Artius and Legacy Origin was effected through the merger of Merger Sub with and into Legacy Origin, with Legacy Origin surviving as the surviving company and as a wholly-owned subsidiary of Artius (the “Merger” and, collectively with the other transactions described in the Merger Agreement, the “Business Combination”). On the Closing Date, Artius changed its name to Origin Materials, Inc. (collectively with its subsidiaries, the “Company”).

For additional information on the Business Combination, please refer to Note 4, *Business Combination*, to these consolidated financial statements.

2. Risks and Liquidity

The Company believes that the Business Combination has provided substantial liquidity and that its \$323.8 million of cash and cash equivalents, restricted cash, and marketable securities will enable it to fund its planned operations for at least twelve months from the issuance date of these consolidated financial statements.

Beginning in March 2020, the COVID-19 pandemic and the measures imposed to contain this pandemic have disrupted and are expected to continue to impact the Company’s business. The magnitude of the impact of the COVID-19 pandemic on the Company’s productivity, results of operations and financial position, and its disruption to the Company’s business and timeline, will depend in part, on the length and severity of these restrictions and on the Company’s ability to conduct business in the ordinary course. We continue to monitor the rapidly evolving conditions and circumstances, as well as guidance from international and domestic authorities, including public health authorities, and we may need to take additional actions based on their recommendations. While the level of disruption caused by, and the economic impact of, COVID-19 has lessened in 2022, there is no assurance that the pandemic will not worsen again, included as a result of the emergence of new strains of the virus. There is still considerable uncertainty regarding the impact on our business stemming from current measures and potential future measures that could restrict access to our facilities, limit manufacturing and support operations and place restrictions on our workforce and suppliers.

In February 2022, Russia began a military intervention in Ukraine. In response, global sanctions were imposed against Russia. These sanctions and the related global ramifications could impact the costs and timing of construction of the Origin 1 and Origin 2 plants including, for example, by increasing the cost of transportation or limiting the availability of certain materials of construction, such as metals used in alloys, that are sourced from Russia or Ukraine.

Inflation rates continue to have an effect on worldwide economies. Inflationary pressures and any shortages in the labor market could increase labor costs, which could have a material adverse impact on our consolidated financial condition.

3. Summary of Significant Accounting Policies

Basis of Presentation

The Company's consolidated financial statements have been prepared in conformity with accounting principles generally accepted in the United States of America ("U.S. GAAP") as determined by the Financial Accounting Standards Board ("FASB") Accounting Standards Codification ("ASC") and pursuant to the regulations of the U.S. Securities and Exchange Commission ("SEC").

Pursuant to the Merger Agreement, the merger between Merger Sub and Legacy Origin was accounted for as a reverse recapitalization in accordance with U.S. GAAP (the "Reverse Recapitalization"). Under this method of accounting, Artius was treated as the "acquired" company and Legacy Origin was treated as the acquirer for financial reporting purposes.

Accordingly, for accounting purposes, the Reverse Recapitalization was treated as the equivalent of Legacy Origin issuing stock for the net assets of Artius, accompanied by a recapitalization. The net assets of Artius are stated at historical cost, with no goodwill or other intangible assets recorded.

Legacy Origin was determined to be the accounting acquirer based on the following predominant factors:

- the Company's Board and management are primarily composed of individuals associated with Legacy Origin;
- Legacy Origin's senior management comprise the senior management roles of the Company and are responsible for the day-to-day operations;
- the Company assumed the "doing business as" name of the Legacy Origin; and
- The intended strategy and operations of the Company continue Legacy Origin's current strategy and operations as a carbon negative materials company with a mission to enable the world's transition to sustainable materials.

The consolidated assets, liabilities and results of operations prior to the Reverse Recapitalization are those of Legacy Origin. The shares and corresponding capital amounts and losses per share, prior to the Business Combination, have been retroactively restated based on shares reflecting the Exchange Ratio (as defined below) established in the Business Combination.

Use of Estimates

The preparation of the consolidated financial statements in accordance with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of commitments and contingencies at the date of the financial statements as well as reported amounts of expenses during the reporting periods. Estimates made by the Company include, but are not limited to, those related to the valuation of common stock and valuation of convertible preferred stock warrants prior to the Business Combination, valuation of the earnout liability, valuation of assumed common stock warrants liability, carrying amount and useful lives of property and equipment and intangible assets, impairment assessments, marketable securities, stock-based compensation expense, probabilities of achievement of performance conditions on performance stock awards, among others. The Company bases these estimates on historical experience and on various other assumptions that it believes are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying amounts of assets and liabilities that are not readily apparent from other sources. Actual results could differ materially from those estimates.

Principles of Consolidation

The consolidated financial statements have been prepared in accordance with U.S. GAAP and applicable rules and regulations of the SEC and include the accounts of the Company and its wholly-owned subsidiaries. All intercompany accounts and transactions have been eliminated in consolidation.

Concentration of Credit Risk

Financial instruments that potentially subject the Company to concentrations of credit risk are primarily cash, cash equivalents and marketable securities. The Company maintains its cash, cash equivalents, and marketable securities accounts with a financial institution where, at times, deposits exceed federal insurance limits. Management believes that the Company is not exposed to significant credit risk as the Company's deposits are held at financial institutions that management believes to be of high credit quality. The Company has not experienced any losses on these deposits.

Cash and Cash Equivalents and Restricted Cash

The Company considers all highly liquid investments with an initial maturity of three months or less at the date of purchase to be cash equivalents. The Company maintains such funds in cash deposits and money market accounts.

Restricted cash consists of cash held in a control account as collateral for the Company's credit card services, escrow services, and standby letter of credit. These restricted cash balances have been excluded from cash and cash equivalents balance and are included within other current assets in the Consolidated Balance Sheets based on the respective maturity dates.

The Company entered into an escrow agreement on September 27, 2019 for \$1.3 million, whereby the funds would be used for construction and transportation services in connection with Origin 1. At December 31, 2022 and 2021, the escrow account had a balance of \$0.3 million.

The Company has a standby letter of credit, whereby the funds may be used for the completion of work, services, and improvements in connection with Origin 1. The standby letter of credit matures and automatically renews in October of each year. At December 31, 2022 and 2021, the standby letter of credit was \$0.2 million.

Cash, cash equivalents, and restricted cash consisted of the following (in thousands):

	December 31, 2022	December 31, 2021
Cash and cash equivalents	\$ 107,858	\$ 46,637
Restricted cash	490	490
Total cash, cash equivalents, and restricted cash	<u>\$ 108,348</u>	<u>\$ 47,127</u>

Marketable Securities

The Company's investment policy requires the Company to purchase investments that meet the definition of available-for-sale securities. The Company does not buy and hold securities principally for the purpose of selling them in the near future. The Company's policy is focused on the preservation of capital, liquidity, and return. The Company considers all of its marketable debt securities as available for use in current operations, including those with maturity dates beyond one year, and therefore classifies these securities within current assets on the consolidated balance sheets. Securities are classified as available for sale and are carried at fair value, with the change in unrealized gains and losses, net of tax, reported as a separate component on the consolidated statements of comprehensive income until realized. Fair value is determined based on quoted market rates when observable or utilizing data points that are observable, such as quoted prices, interest rates and yield curves. Securities with an amortized cost basis in excess of estimated fair value are assessed to determine what amount of the excess, if any, is caused by expected credit losses. Expected credit losses on securities are recognized in other income (expense), net on the consolidated statements of operations and comprehensive income (loss), and any remaining unrealized losses, net of taxes, are included in accumulated other comprehensive income (loss) in the consolidated statements of redeemable convertible preferred stock, stockholders' equity and accumulated other comprehensive income (loss). For the purposes of computing realized and unrealized gains and losses, the cost of securities sold is based on the specific-identification method. Interest on securities classified as available for sale is included as a component of interest income within other income (expense).

The nature of these financial instruments include instruments for which quoted prices are available but traded less frequently, instruments whose fair value has been derived using a model where inputs to the model are directly observable in the market, or can be derived principally from or corroborated by observable market data, and instruments that are fair valued using other financial instruments, the parameters of which can be directly observed. Level 2 financial instruments include agency mortgage-backed securities, corporate fixed income securities infrequently traded, and other securities, which primarily consist of sovereign debt, U.S. government agency securities, loans, and state and municipal securities.

Derivative Financial Instruments

The Company evaluated the stockholder convertible notes payable in accordance with ASC 815, *Derivatives and Hedging* and determined that the embedded components of these contracts qualify as a derivative to be separately accounted for as a liability. The Company records the fair value of the embedded components in accordance with ASC 815, *Derivatives and Hedging*. The fair value of the derivatives was calculated using a model that estimated the value that would be paid to transfer the liability in an orderly transaction between market participants at the measurement date. The fair value of the derivative liabilities is revalued on each balance sheet date with a corresponding gain or loss recorded in the Consolidated Statements of Operations and Comprehensive Income (Loss).

The Company enters into foreign currency derivative contracts with financial institutions to reduce foreign exchange risk related to marketable securities. The Company uses forward currency derivative contracts to minimize the Company's exposure to balances primarily denominated in the British Pound Sterling and Australian Dollar. The Company's foreign currency derivative contracts, which are not designated as hedging instruments, are used to reduce the exchange rate risk associated primarily with marketable securities. The Company's derivative financial instruments program is not designated for trading or speculative purposes. Outstanding foreign currency derivative contracts are recorded at fair value on the consolidated balance sheets.

Foreign currency derivative contracts are marked-to-market at the end of each reporting period with gains and losses recognized in the change in fair value of derivatives within other (income) expense. While the contract or notional amount is often used to express the volume of foreign currency derivative contracts, the amounts potentially subject to credit risk are generally limited to the amounts, if any, by which the counterparties' obligations under the agreements exceed the obligations of the Company to the counterparties. The notional amount of foreign currency derivative contracts as of December 31, 2022 and 2021 was \$21.2 million and \$63.7 million, respectively.

Fair Value of Financial Instruments

The Company applies the fair value measurement accounting standard whenever other accounting pronouncements require or permit fair value measurements. Fair value is defined in the accounting standard 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. The fair value hierarchy under current accounting guidance prioritizes the inputs to valuation techniques used to measure fair value into three broad levels (Level 1, Level 2, and Level 3).

Level 1 inputs are unadjusted quoted prices in active markets for identical assets or liabilities that the Company has the ability to access at the measurement date. Level 2 inputs are inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly. Level 3 inputs are unobservable inputs for the asset or liability and reflect the Company's own assumptions about the assumptions that market participants would use in pricing the asset or liability (including assumptions about risk) in a principal market.

The carrying amounts of working capital balances approximate their fair values due to the short maturity of these items. Unless otherwise noted, it is management's opinion that the Company is not exposed to significant interest rate, currency, or credit risks arising from its financial instruments. We have determined the fair value of debt approximates the carrying value due to the standard terms of the arrangement including but not limited to the amount borrowed, the term, and the interest rate.

The fair values of the Assumed Common Stock Warrants which are publicly traded are level 1 inputs. The fair value of the Assumed Common Stock Warrants which are not publicly traded, cash equivalents, marketable securities, and foreign currency derivative contracts are level 2 inputs as the Company uses quoted market prices or alternative pricing sources and models utilizing observable market inputs. The earnout liability, derivative liability and redeemable convertible preferred stock warrant liability were estimated using Level 3 inputs.

Other Receivables

Other receivables consist of amounts due from foreign governmental entities related to the Canadian harmonized sales tax ("HST") and goods and services tax ("GST") for goods and services transacted in Canada, and amounts due from cash collateral held by others for foreign currency derivative contracts.

AgriScience Grant

In January 2019, the Company entered into an agreement in which it will participate in the AgriScience Program Cluster Component grant through the Canadian Agricultural Partnership, whereby the Company will receive reimbursements for eligible expenditures up to approximately \$1.8 million (in Canadian dollars) through March 2023. Grants are received through reimbursements from the Canadian government and recognized, upon completion of scope of services on a quarterly basis. Grants are recognized as a reduction of property, plant, and equipment or expense based on the nature of the cost the grant is reimbursing. During the year ended December 31, 2022, 2021 and 2020 the Company received \$0.4 million, \$0.0 million and \$0.2 million, respectively, in grants which recorded in other income.

Property, Plant, and Equipment

Property, plant, and equipment are recorded at cost and depreciated or amortized using the straight-line method over the estimated useful lives of the respective assets. Existing useful lives range from 3 to 5 years. Leasehold improvements are amortized using the straight-line method over the shorter of their estimated useful lives or the lease term. Major additions and improvements are capitalized, while replacements, repairs, and maintenance that do not extend the life of an asset are charged to operations. We depreciate plants over a maximum life of 40 years and plant improvements over the shorter of the asset life or remaining useful life of the plants structure using the straight-line method. Upon retirement or sale, the cost of assets disposed of and the related accumulated depreciation or amortization are removed from the accounts. Costs incurred to acquire, construct or install property, plant, and equipment during the construction stage of a capital project and costs capitalized in conjunction with major improvements that have not yet been placed in service are recorded as construction in progress, and accordingly are not currently being depreciated. The Company capitalizes interest cost incurred on funds used to construct property, plant and equipment. The estimated useful lives of assets are as follows:

Computer and other equipment	3 years
Pilot plant	5 years
Machinery and equipment	5 years
Leasehold improvements	1-5 years
Plants and improvements	20-40 years

Intangible Assets

Intangible assets are recorded at cost and are amortized using the straight-line method over the estimated useful lives of the respective assets, ranging from 7 to 15 years. The cost of servicing the Company's patents is expensed as incurred. Upon retirement or sale, the cost of intangible assets is disposed of and the related accumulated amortization is removed from the accounts.

Impairment of Long-Lived Assets

The Company reviews its long-lived assets, including property, equipment, software and intangibles, for impairment whenever events or changes in circumstances indicate that the carrying amounts of the assets may not be fully recoverable. If indicators of impairment exist, management identifies the asset group which includes the potentially impaired long-lived asset, at the lowest level at which there are separate, identifiable cash flows. If the total of the expected undiscounted future net cash flows for the asset group is less than the carrying amount of the asset, a loss is recognized for the difference between the fair value and carrying amount of the asset. For the year ended December 31, 2022 and 2021, no impairment was identified.

Government Loans

Government loans are classified as a noncurrent liability and recorded at amortized cost. Forgiveness of the balances due is recorded through earnings and occurs when there is confirmation from the governmental authority that the Company has complied with the conditions for forgiveness attached to the loan.

Debt Issuance Costs

The costs incurred in connection with the issuance of debt obligations, principally financing and legal costs, are capitalized. These costs are accreted over the term of the debt using the interest method. During the year ended December 31, 2022, 2021 and 2020, accretion expense for debt issuance cost was zero, \$2.2 million and \$0.1 million, respectively.

Redeemable Convertible Preferred Stock Warrants Liability

Free-standing warrants issued by Legacy Origin for the purchase of shares of its convertible preferred stock were classified as liabilities on the accompanying balance sheets at fair value using an Option-Pricing Model. Prior to the Business Combination, the liability recorded was adjusted for changes in the fair value at each reporting date and recorded as interest expense in the accompanying Consolidated Statements of Operations and Comprehensive Income (Loss). As a result of the Business Combination, the Legacy Origin warrants each converted into a warrant to purchase shares of the Company's Common Stock converted at the Exchange Ratio. The fair value of the warrants upon consummation of the Business Combination (see Note 4), is adjusted based on the price of the underlying Common Stock, was reclassified to additional paid-in capital.

Assumed Common Stock Warrants Liability

The Company assumed 24,149,960 public warrants (the "Public Warrants") and 11,326,667 private placement warrants (the "Private Placement Warrants", and the Public Warrants together with the Private Placement Warrants, the "Assumed Common Stock Warrants") upon the Business Combination, all of which were issued in connection with Artius' initial public offering and entitle each holder to purchase one share of Class A common stock at an exercise price of at \$11.50 per share. As of December 31, 2022, 24,149,960 Public Warrants and 11,326,667 Private Placement Warrants are outstanding. The Public Warrants are publicly traded and are exercisable for cash unless certain conditions occur, such as the failure to have an effective registration statement related to the shares issuable upon exercise or redemption by the Company under certain conditions, at which time the warrants may be cashless exercised. The Private Placement Warrants are transferable, assignable or salable in certain limited exceptions. The Private Placement Warrants are exercisable for cash or on a cashless basis, at the holder's option, and are non-redeemable so long as they are held by the initial purchasers or their permitted transferees. If the Private Placement Warrants are held by someone other than the initial purchasers or their permitted transferees, the Private Placement Warrants will cease to be Private Placement Warrants, and become Public Warrants and be redeemable by the Company and exercisable by such holders on the same basis as the other Public Warrants.

The Company evaluated the Assumed Common Stock Warrants under ASC 815-40, *Derivatives and Hedging-Contracts in Entity's Own Equity* ("ASC 815-40"), and concluded they do not meet the criteria to be classified in stockholders' equity. Specifically, the exercise of the Assumed Common Stock Warrants may be settled in cash upon the occurrence of a tender offer or exchange that involves 50% or more of our Class A stockholders. Because not all of the voting stockholders need to participate in such tender offer or exchange to trigger the potential cash settlement and the Company does not control the occurrence of such an event, the Company concluded that the Assumed Common Stock Warrants do not meet the conditions to be classified in equity. Since the Assumed Common Stock Warrants meet the definition of a derivative under ASC 815, the Company recorded these warrants as liabilities on the Consolidated Balance Sheets at fair value, with subsequent changes in their respective fair values recognized in the change in fair value of Assumed Common Stock Warrant liabilities within the Consolidated Statements of Operations and Comprehensive Income (Loss) at each reporting date. The Public Warrants were publicly traded and thus had an observable market price to estimate fair value, and the Private Placement Warrants were effectively valued similar to the Public Warrants, as described in Note 6.

Earnout Liability

The Company has recorded an earnout liability related to future contingent equity shares related to the Business Combination (Note 13). The Company recorded these instruments as liabilities on the Consolidated Balance Sheets at fair value, with subsequent changes in their respective fair values recognized in earnings at each reporting date.

Leases

The Company has leases for office space and equipment, some of which have escalating rentals during the initial lease term and during subsequent optional renewal periods. The Company accounts for its leases under ASC Topic 842, *Leases*. The Company recognizes a right-of-use asset and lease liability for leases based on the net present value of future minimum lease payments. Lease expense is recognized on a straight-line basis over the non-cancelable lease term and renewal periods that are considered reasonably certain to be exercised.

Research and Development Cost

Costs related to research and development are expensed as incurred.

Stock-Based Compensation

The Company has issued common stock awards under three equity incentive plans. Origin measures stock options and other stock-based awards granted to employees, directors and other service providers based on their fair value on the date of grant and recognizes compensation expenses of those awards over the requisite service period, which is generally the vesting period of the respective award. For awards with performance conditions, compensation is recorded once there is sufficient objective evidence the performance conditions are considered probable of being met. Origin applies the straight-line method of expense recognition to all awards with only service-based vesting conditions. Origin estimates the fair value of each stock option grant on the date of grant using the Black-Scholes option-pricing model and the grant date closing stock price for RSU awards and performance awards. The Black-Scholes option-pricing model requires the use of highly subjective assumptions including:

- *Expected term* – The expected term of the options is based on the simplified method, which takes into consideration the grant's contractual life and vesting period and assumes that all options will be exercised between the vesting date and the contractual term of the option which averages an award's vesting term and its contractual term.
- *Expected volatility* – The Company uses the trading history of various companies in its industry sector in determining an estimated volatility factor.
- *Expected dividend* – The Company has not declared common stock dividends and does not anticipate declaring any common stock dividends in the foreseeable future.
- *Forfeiture* – The Company estimates forfeitures based on historical activity and considers voluntary and involuntary termination behavior as well as analysis of actual historical option forfeitures, netting the estimated expense by the derived forfeiture rate.
- *Risk-free interest rate* – The Company bases the risk-free interest rate on the implied yield currently available on U.S. Treasury zero-coupon issues with the same or substantially equivalent remaining term.

Income Taxes

Deferred income taxes are determined using the asset and liability method. Under this method, deferred income tax assets and liabilities are determined based on differences between the financial reporting and tax bases of assets and liabilities and are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse. A valuation allowance is recorded when the expected recognition of a deferred income tax asset is considered to be unlikely.

The Company recognizes the tax benefit from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by the tax authorities, based on the technical merits of the position. The tax benefit is measured based on the largest benefit that has a greater than 50% likelihood of being realized upon ultimate settlement. The Company recognizes interest and penalties related to income tax matters as a component of income tax expense.

Functional Currency Translation

The functional currency of the Company's wholly-owned Canadian subsidiaries is the Canadian dollar, whereby their assets and liabilities are translated at period-end exchange rates except for nonmonetary capital transactions and balances, which are translated at historical rates. All income and expense amounts of the Company are translated at average exchange rates for the respective period. Translation gains and losses are not included in determining net loss but are accumulated in a separate component of stockholders' equity. Foreign currency transaction gains and losses are included in the determination of net loss in the period in which they occur. These amounts are included in other income, net, of the Consolidated Statements of Operations and Comprehensive Income (Loss).

Comprehensive Income (Loss)

The Company's comprehensive income or loss consists of net income or loss and other comprehensive income (loss). Foreign currency translation gains or losses and unrealized gains or losses on available-for-sale marketable debt securities are included in the Company's other comprehensive income (loss).

Basic and Diluted Net Income (Loss) Per Share

Basic net income (loss) per common share is calculated by dividing the net income (loss) attributable to common stockholders by the weighted-average number of common shares outstanding during the period, without consideration of potentially dilutive securities. Diluted net income (loss) per share is computed by dividing the net income (loss) attributable to common stockholders by the weighted-average number of common stock and potentially dilutive securities outstanding for the period. For the purposes of the diluted net income (loss) per share calculation, the convertible preferred stock, common stock options, RSU awards, performance stock awards, convertible preferred stock warrants, common stock warrants, convertible notes, earnout shares, and Sponsor Vesting Shares (as defined below) are considered to be potentially dilutive securities. Basic and diluted net income (loss) per share attributable to common stockholders is presented in conformity with the two-class method required for participating securities. The two-class method determines net income (loss) per share for each class of common and participating securities according to dividends declared or accumulated and participation rights in undistributed earnings. All series of the Company's convertible preferred stock are considered to be participating securities because, in addition to cumulative dividends, all holders are entitled to receive a non-cumulative dividend on a *pari passu* basis in the event that a dividend is paid on the common stock. The two-class method requires income or loss available to common stockholders for the period to be allocated between common and participating securities based upon their respective rights to share in undistributed earnings as if all income or loss for the period had been distributed. The holders of the convertible preferred stock do not have a contractual obligation to share in the Company's losses. Accordingly, the Company's net income (loss) is attributed entirely to common stockholders. For the periods presented that the Company has reported a net loss, diluted net loss per common share is the same as basic net loss per common share for those periods.

Reclassifications

Certain amounts in prior periods have been reclassified to conform with the report classifications of the year ended December 31, 2021, noting the Company has reflected the Reverse Recapitalization pursuant to the Business Combination for all periods presented within the Consolidated Balance Sheets and Consolidated Statements of Redeemable Convertible Preferred Stock, Stockholders' Equity and Accumulated Other Comprehensive Income (Loss).

Segment Reporting

The Company operates in a single segment. Operating segments are identified as components of an enterprise about which separate discrete financial information is available for evaluation by the chief operating decision maker ("CODM") in making decisions regarding resource allocation and assessing performance. The Company has determined that its Co-Chief Executive Officers are the CODM. To date, the Company's CODM has made such decisions and assessed performance at the Company level.

As of December 31, 2022 and 2021, the Company had \$157.2 million and \$60.6 million, respectively, of assets located outside of the United States.

4. Business Combination

On June 25, 2021, Artius and Micromidas, Inc. (now known as Origin Materials Operating, Inc., “Legacy Origin”) completed the Business Combination pursuant to the Merger Agreement with Legacy Origin surviving the merger as a wholly owned subsidiary of Artius, which became Origin Materials, Inc. Cash proceeds from the Business Combination totaled approximately \$467.5 million, which included funds held in Artius’s trust account and the completion of the concurrent PIPE and Backstop Financing.

In accordance with the terms and subject to the conditions of the Merger Agreement, at the effective time of the Merger, (i) all shares of Legacy Origin’s Series A, Series B, and Series C Preferred Stock, and Common Stock (collectively, “Legacy Origin Stock”) issued and outstanding immediately prior to the effective time of the Merger were converted into the right to receive their pro rata portion of shares of Company Common Stock (the “Common Stock”) issued as Merger consideration (the “Merger Consideration”); (ii) holders of Legacy Origin’s Convertible Notes Payable, plus accrued interest also received shares of Company Common Stock; (iii) each option exercisable for Legacy Origin Stock that was outstanding immediately prior to effective time of the Merger was assumed and continues in full force and effect on the same terms and conditions as were previously applicable to such options, subject to adjustments to exercise price and number of shares Common Stock issuable upon exercise based on the final conversion ratio calculated in accordance with the Merger Agreement. Additionally, as part of the consideration transferred, stockholders of Legacy Origin and Artius were given the right to additional shares in the Company. These shares vest to the holder upon the share price of the Company reaching certain targets over a future period (“Earnout Shares”, see Note 13).

The Company accounted for the Business Combination as the Reverse Recapitalization, which is the equivalent of Legacy Origin issuing stock for the net assets of Artius, accompanied by a recapitalization, with Artius treated as the acquired company for accounting purposes. The determination of Artius as the “acquired” company for accounting purposes was primarily based on the fact that subsequent to the Business Combination, Legacy Origin will comprise all of the ongoing operations of the combined entity, a majority of the governing body of the combined company and Legacy Origin’s senior management will comprise all of the senior management of the combined company. The net assets of Artius were stated at historical cost with no goodwill or other intangible assets recorded. Reported results from operations included herein prior to the Business Combination are those of Legacy Origin. The shares and corresponding capital amounts and loss per share related to Legacy Origin’s outstanding convertible preferred stock and common stock prior to the Business Combination have been retroactively restated to reflect the conversion ratio established in the Merger Agreement (1.00 Legacy Origin share for approximately 2.11 shares of the Company, the Exchange Ratio).

In connection with the Business Combination, the Company incurred underwriting fees and other costs considered direct and incremental to the transaction totaling \$36.7 million, consisting of legal, accounting, financial advisory and other professional fees. These amounts are reflected within additional paid-in capital in the Consolidated Balance Sheets as of December 31, 2022 and 2021.

PIPE Financing

Concurrent with the execution of the Business Combination, the Company entered into subscription agreements with certain investors (the “PIPE Investors”) pursuant to which the PIPE Investors subscribed for and purchased an aggregate of 20,000,000 shares of Common Stock for an aggregate purchase price of \$200.0 million.

Backstop Agreement

Concurrent with the execution of the Business Combination, the Company entered into various subscription agreements (the “Subscription Agreements”) with certain current shareholders of the Company or their affiliates (collectively, the “Subscribers”), pursuant to which the Subscribers agreed, subject to certain conditions in the Subscription Agreements, to purchase an aggregate amount of 4,300,001 shares of common stock of the Company, par value \$0.0001 per share (the “Subscription Shares”), at \$10.00 per share.

Summary of Net Proceeds

The following table summarizes the elements of the net proceeds from the Business Combination at the date of acquisition (in thousands):

Cash—Trust Account (net of redemptions of \$439.0 million)	\$ 260,448
Cash	60
Cash—PIPE & Backstop Financing	243,000
Non-cash net assets assumed from Artius	40
Less: Fair value of assumed common stock warrants	(83,370)
Less: Underwriting fees and other issuance costs paid prior to the date of acquisition	(34,773)
Additional Paid-in-Capital from Business Combination, net of issuance costs paid	\$ 385,405
Less: Non-cash net assets assumed from Artius	(40)
Add: Non-cash fair value of assumed common stock warrants	83,370
Add: Other issuance costs included in accounts payable and accrued liabilities	761
Less: Accrued liabilities extinguished through proceeds from Business Combination	(1,966)
Cash proceeds from the Business Combination	<u>\$ 467,530</u>

Summary of Shares Issued

The following table summarizes the number of shares of Common Stock outstanding immediately following the consummation of the Business Combination:

Artius shares outstanding prior to the Business Combination, including 4,500,000 Sponsor Vesting Shares	90,562,500
Less: redemption of Artius shares	(43,880,956)
Shares issued pursuant to the PIPE and Backstop Financing	24,300,001
Business Combination and PIPE Financing shares, including 4,500,000 Sponsor Vesting Shares	70,981,545
Conversion of Legacy Origin Series A preferred stock for common stock	33,783,099
Conversion of Legacy Origin Series B preferred stock for common stock	19,755,784
Conversion of Legacy Origin Series C preferred stock for common stock	6,286,349
Conversion of Legacy Origin convertible notes for common stock	2,049,212
Conversion of Legacy Origin common stock for common stock	2,838,041
Issuance of common stock upon exercise of warrants	5,554,440
Total shares of the Company common stock outstanding immediately following the Business Combination	<u>141,248,470</u>

5. Recent Accounting Pronouncements

Recently Adopted Accounting Pronouncements

In August 2020, the FASB issued Accounting Standards Update (“ASU”) 2020-06, *Accounting for Convertible Instruments and Contracts in an Entity’s Own Equity*, which simplifies the accounting for certain financial instruments with characteristics of liabilities and equity, including convertible instruments and contracts in an entity’s own equity. The guidance is effective for fiscal years beginning on or after December 15, 2021, with early adoption permitted, but no earlier than fiscal years beginning after December 15, 2020. The Company adopted the new standard as of January 1, 2022. The adoption of the standard had no material impact on the Company’s financial results.

In March 2020, the FASB issued ASU 2020-04, *Reference Rate Reform ("Topic 848"): Facilitation of the Effects of Reference Rate Reform on Financial Reporting*, as amended and supplemented by subsequent ASUs (collectively, "ASU 2020-04"), which provides practical expedients for contract modifications and certain hedging relationships associated with the transition from reference rates that are expected to be discontinued. This guidance is applicable for borrowing instruments, which use LIBOR as a reference rate, and is effective immediately, but is only available through December 31, 2022. The Company adopted the new standard as of January 1, 2022. The adoption of the standard had no material impact on the Company's financial results.

In November 2021, the FASB issued ASU 2021-10, *Government Assistance ("Topic 832"), Disclosures by Business Entities about Government Assistance*. The FASB issued this update to increase the transparency of government assistance including the disclosure of (1) the types of assistance, (2) an entity's accounting for the assistance, and (3) the effect of the assistance on an entity's financial statements. The main provisions of this update require the following disclosures about transactions with a government that are accounted for by applying a grant or contribution accounting model by analogy:

- (i) Information about the nature of the transactions and the related accounting policy used to account for the transactions
- (ii) The line items on the balance sheet and income statement that are affected by the transactions, and the amounts applicable to each financial statement line item
- (iii) Significant terms and conditions of the transactions, including commitments and contingencies.

The amendments in this update are effective for the Company in the annual period beginning after December 15, 2021. Early application of the amendments is permitted. The Company has elected to adopt on January 1, 2022. The adoption of the standard had no impact on the Company's financial results. See Note 3 and Note 14 for required disclosures.

Recently Issued Accounting Pronouncements Not Yet Adopted

In October 2021, the FASB issued ASU 2021-08, *Business Combinations (Topic 805), Accounting for Contract Assets and Contract Liabilities from Contracts with Customers*. This update improves the accounting for acquired revenue contracts with customers in a business combination by addressing diversity in practice and inconsistency related to (1) recognition of an acquired contract liability; and (2) payment terms and their effect on subsequent revenue recognized by the acquirer. Specifically, the update requires that an entity (acquirer) recognize and measure contract assets and contract liabilities acquired in a business combination in accordance with ASC Topic 606, *Revenue from Contracts with Customers*. The amendments in this update are effective for the Company in the fiscal year beginning after December 15, 2022, including interim periods within those fiscal years. Early adoption of the amendments is permitted, including adoption in an interim period. The pronouncement is not expected to have a significant impact on the Company's consolidated financial statements.

In March 2022, the FASB issued ASU 2022-01, *Derivatives and Hedging ("Topic 815") ("ASU 2022-01")*. This update clarifies the guidance in Topic 815 on fair value hedge accounting of interest rate risk for portfolios and financial assets. Among other things, the amended guidance established the "last-of-layer" method for making the fair value hedge accounting for these portfolios more accessible and renamed that method the "portfolio layer" method. ASU 2022-01 is effective January 1, 2023 and is not expected to have a significant impact on the Company's consolidated financial statements.

6. Fair Value Measurement

The Company's financial assets and liabilities subject to fair value measurements on a recurring basis and the level of inputs used for such measurements were as follows:

(in thousands)	Fair Value as of December 31, 2022			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash, cash equivalents and restricted cash	\$ 108,348	\$ —	\$ —	\$ 108,348
Marketable securities	—	215,464	—	215,464
Total fair value	\$ 108,348	\$ 215,464	\$ —	\$ 323,812
Liabilities:				
Assumed common stock warrants (Public)	\$ 21,015	\$ —	\$ —	\$ 21,015
Assumed common stock warrants (Private Placement)	—	9,856	—	9,856
Earnout liability	—	—	42,533	42,533
Derivative liability	—	344	—	344
Total fair value	\$ 21,015	\$ 10,200	\$ 42,533	\$ 73,748

(in thousands)	Fair Value as of December 31, 2021			
	Level 1	Level 2	Level 3	Total
Assets:				
Cash, cash equivalents and restricted cash	\$ 47,127	\$ —	\$ —	\$ 47,127
Marketable securities	—	397,458	—	397,458
Derivative asset	—	202	—	202
Total fair value	\$ 47,127	\$ 397,660	\$ —	\$ 444,787
Liabilities:				
Assumed common stock warrants (Public)	\$ 35,983	\$ —	\$ —	\$ 35,983
Assumed common stock warrants (Private Placement)	—	16,877	—	16,877
Earnout liability	—	—	127,757	127,757
Derivative liability	—	103	—	103
Total fair value	\$ 35,983	\$ 16,980	\$ 127,757	\$ 180,720

The Company performs routine procedures such as comparing prices obtained from independent sources to ensure that appropriate fair values are recorded. The marketable securities are categorized as Level 2 instruments as the estimated fair value was determined based on the estimated or actual bids and offers of the marketable securities in an over-the-counter market on the last business day of the period. All of the Company's cash, cash equivalents, restricted cash, marketable securities and foreign currency derivative contracts are classified within Level 1 or Level 2 because the Company's cash, cash equivalents, restricted cash, marketable securities and foreign currency derivative contracts are valued using quoted market prices or alternative pricing sources and models utilizing observable market inputs. Because the transfer of Private Placement Warrants to anyone outside of certain permitted transferees of Artius Acquisition Partners LLC (the "Sponsor") would result in the Private Placement Warrants having substantially the same terms as the Public Warrants, the Company determined that the fair value of each Private Placement Warrant is consistent with that of a Public Warrant. Accordingly, the Private Placement Warrants are classified as Level 2 financial instruments.

The value of the Earnout liability is classified as Level 3 measurements under the fair value hierarchy, as these liabilities have been valued based on significant inputs not observable in the market.

As of December 31, 2022 and 2021, the carrying values of cash and cash equivalents, accounts payable and accrued liabilities approximate their respective fair values due to their short-term nature.

Marketable Securities

The Company's marketable securities that are measured at fair value on a recurring basis and are categorized using the fair value hierarchy. Amortized cost net of unrealized gain (loss) is equal to fair value. The following table summarized the marketable securities by major security type as follows:

As of December 31, 2022

(in thousands)

Investments Classified as Marketable Securities	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Commercial paper	\$ 17,568	\$ 38	\$ —	\$ 17,606
Corporate bonds	115,134	—	(4,923)	110,211
Asset-backed securities	70,825	8	(3,885)	66,948
U.S. government and agency securities	19,308	—	(917)	18,391
Foreign government and agency securities	375	—	(37)	338
Municipal/provincial bonds and other	2,000	—	(30)	1,970
Total marketable securities	<u>\$ 225,210</u>	<u>\$ 46</u>	<u>\$ (9,792)</u>	<u>\$ 215,464</u>

As of December 31, 2021

(in thousands)

Investments Classified as Marketable Securities	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Corporate bonds	\$ 274,939	\$ 100	\$ (1,725)	\$ 273,314
Asset-backed securities	96,713	190	(199)	96,704
U.S. government and agency securities	20,235	—	(64)	20,171
Foreign government and agency securities	3,262	—	(19)	3,243
Municipal/provincial bonds and other	4,000	5	—	4,005
Total	\$ 399,149	\$ 295	\$ (2,007)	\$ 397,437
Pending purchases and sales	21	—	—	21
Total marketable securities	<u>\$ 399,170</u>	<u>\$ 295</u>	<u>\$ (2,007)</u>	<u>\$ 397,458</u>

Any realized gains and losses and interest income are included in other income on the Consolidated Statements of Operations and Comprehensive Income (Loss).

We sold marketable securities for proceeds of \$3,815.9 million, \$2,024.1 million and zero during the year ended December 31, 2022, 2021 and 2020, respectively. As a result of those sales, we realized a loss of \$1.0 million, a gain of \$0.2 million, and zero during the year ended December 31, 2022, 2021 and 2020, respectively. We regularly review our available-for-sale marketable securities in an unrealized loss position and evaluate the current expected credit loss by considering factors such as historical experience, market data, issuer-specific factors, and current economic conditions. The aggregate fair value of the marketable securities in unrealized loss position was \$193.5 million and \$346.3 million as of December 31, 2022 and 2021, respectively. The unrealized losses were attributable to changes in interest rates that impacted the value of the investments, and not related to increased credit risk. Accordingly, we have not recorded an allowance for credit losses associated with these investments.

The contractual maturities of the investments classified as marketable securities are as follows:

(in thousands)	As of December 31, 2022			
	Mature within one year	Mature after one year through two years	Mature over two years	Fair Value
Commercial paper	\$ 17,606	\$ —	\$ —	\$ 17,606
Corporate bonds	74,797	35,414	—	110,211
Asset-backed securities	1,907	4,833	60,207	66,947
U.S. government and agency securities	7,719	7,480	3,192	18,391
Foreign government and agency securities	—	338	—	338
Municipal/provincial bonds and other	1,971	—	—	1,971
Total marketable securities	<u>\$ 104,000</u>	<u>\$ 48,065</u>	<u>\$ 63,399</u>	<u>\$ 215,464</u>

(in thousands)	As of December 31, 2021			
	Mature within one year	Mature after one year through two years	Mature over two years	Fair Value
Corporate bonds	\$ 92,559	\$ 134,199	\$ 46,556	\$ 273,314
Asset-backed securities	—	2,000	94,704	96,704
U.S. government and agency securities	—	7,995	12,176	20,171
Foreign government and agency securities	2,877	—	366	3,243
Municipal/provincial bonds and other	2,002	2,003	—	4,005
Total	\$ 97,438	\$ 146,197	\$ 153,802	\$ 397,437
Pending purchases and sales	21	—	—	21
Total marketable securities	<u>\$ 97,459</u>	<u>\$ 146,197</u>	<u>\$ 153,802</u>	<u>\$ 397,458</u>

Redeemable Convertible Preferred Stock Warrant Liability

Free-standing warrants issued by Legacy Origin for the purchase of shares of its convertible preferred stock were classified as liabilities on the accompanying balance sheets at fair value using an Option-Pricing Model (“OPM”). Prior to the Business Combination, the liability recorded was adjusted for changes in the fair value at each reporting date and recorded as interest expense in the accompanying Consolidated Statements of Operations and Comprehensive Income (Loss). As a result of the Business Combination, the Legacy Origin warrants each converted into common stock of Origin at the Exchange Ratio defined in the Merger Agreement.

Derivative Asset and Liabilities

Beginning in the year ended December 31, 2021, the Company entered into foreign currency derivative contracts with financial institutions to reduce foreign exchange risk related to certain marketable securities denominated in foreign currency. Foreign currency derivative contracts are marked-to-market at the end of each reporting period with gains and losses recognized as other income (expense). During the year ended December 31, 2022 and 2021, the Company recognized a net loss of \$0.4 million and a net gain of \$0.1 million, respectively, on the fair value adjustment of the foreign currency derivative contracts.

The following table sets forth a summary of the activities of the Company's redeemable convertible preferred stock warrant liability and embedded components of the stockholder convertible notes payable, which represents a recurring measurement that is classified within Level 3 of the fair value hierarchy wherein fair value is estimated using significant unobservable inputs:

<i>Redeemable Convertible Preferred Stock Warrant</i> (in thousands)	Years Ended December 31,	
	2022	2021
Beginning warrant liability balance	\$ —	\$ 19,233
Change in fair value of warrants liability	—	35,034
Reclassification to APIC upon recapitalization	—	(54,267)
Ending warrant liability balance	<u>\$ —</u>	<u>\$ —</u>

<i>Embedded Derivative - Stockholder Convertible Notes Payable</i> (in thousands)	Years Ended December 31,	
	2022	2021
Beginning derivative liabilities balance	\$ —	\$ 1,238
Change in fair value	—	(1,238)
Ending derivative liabilities balance	<u>\$ —</u>	<u>\$ —</u>

7. Property, Plant and Equipment

Property, plant, and equipment consisted of the following:

(in thousands)	December 31, 2022	December 31, 2021
Land	\$ 11,358	\$ 912
Pilot plant	4,599	5,517
Lab equipment	2,526	2,227
Machinery and equipment	948	655
Computer and other equipment	598	388
Construction in process	138,847	55,026
Total	158,876	64,725
Less accumulated depreciation and amortization	(4,693)	(7,540)
Total property, plant, and equipment, net	<u>\$ 154,183</u>	<u>\$ 57,185</u>

For the year ended December 31, 2022, 2021 and 2020, depreciation expense totaled \$0.7 million, \$0.5 million and \$0.5 million, respectively.

At December 31, 2022 and 2021, the Company capitalized \$1.1 million and \$0.9 million, respectively, of interest cost into Origin 1. At December 31, 2022 and 2021, the Company capitalized \$1.9 million and \$0.9 million of stock-based compensation related to employees whose costs are necessarily incurred to bring the asset to its intended use. At December 31, 2022 and 2021 a cumulative translation adjustment of \$3.0 million and \$(0.1) million, respectively, is included in total property, plant, and equipment as a result of foreign currency transaction gains and losses.

8. Intangible Assets

Intangible assets consisted of the following:

(in thousands)	December 31, 2022	December 31, 2021
Patents	\$ 404	\$ 432
Less accumulated amortization	(244)	(217)
Total intangible assets	<u>\$ 160</u>	<u>\$ 215</u>

The weighted average useful life of the patents was 4.41 years. For the year ended December 31, 2022, 2021 and 2020, amortization expense was \$0.0 million.

9. Consortium Agreement

The Company entered into consortium agreements with counterparties to collaborate on development of a process to commercialize bio-based, decarbonizing materials for application on an industrial scale at a competitive price. The agreements expire once performance of the research and development program has been completed. At the time the consortium agreements were entered into, several of the counterparties were related parties (Note 11).

In 2020, an additional counterparty, that is not a related party, was added to the consortium agreement. Under the consortium agreement, the Company received zero, \$0.5 million and \$0.6 million during the year ended December 31, 2022, 2021 and 2020, respectively, which was recorded as other income, net in the Consolidated Statements of Operations and Comprehensive Income (Loss).

10. PPP Loan

In April 2020, the Company executed a promissory note (the “PPP Note”) evidencing an unsecured loan in the amount of \$0.9 million under the PPP Loan. The Paycheck Protection Program (or “PPP”) was established under the Coronavirus Aid, Relief, and Economic Security Act (the “CARES Act”) and is administered by the U.S. Small Business Administration (“SBA”). The PPP Loan has been made through First Republic Bank (the “Lender”).

The PPP Loan had a two-year term and bore interest at a rate of 1.00% per annum, accruing upon funding. Unless the PPP Loan is forgiven, the Company was required to make monthly payments of principal and interest to the Lender. The Company did not intend to seek forgiveness of the PPP loan.

The PPP Note contained customary events of default relating to, among other things, payment defaults, providing materially false and misleading representations to the SBA or Lender, or breaching the terms of the PPP Loan documents. The occurrence of an event of default may result in the immediate repayment of all amounts outstanding, collection of all amounts owing from the Company, or filing suit and obtaining judgment.

The PPP Loan was paid in full during the year ended December 31, 2021.

11. Related Party Transactions

Consortium Agreements

In December 2016, the Company entered into a consortium agreement (Note 9) with two Legacy Origin Series B preferred stock investors to collaborate on development of a process to commercialize bio-based, decarbonizing materials for application on an industrial scale at a competitive price. Under the consortium agreement, the Company received \$0.5 million. The agreement expires once performance of the research and development program has been completed.

In August 2018, the agreement was amended, whereby a Legacy Origin Series C preferred stock investor (the “Legacy Origin Series C Investor”, and collectively with the two Legacy Origin Series B investors, the “Legacy Origin Investors”) was added to the agreement and committed to invest \$1.5 million of research and development in the consortium. As of December 31, 2022, the Legacy Origin Series C Investor had not invested any funds in the consortium.

Offtake Agreements

The Company maintains eight separate offtake supply agreements including five with Legacy Origin stockholders or affiliates of Legacy Origin stockholders (the “Offtake Agreements”). Two of the eight offtake agreements are with the same customer and pertain to supply of product from Origin 1 and Origin 2, respectively. Pursuant to the Offtake Agreements, the Company will construct manufacturing plants with specific capacity and product quality requirements within certain timeframes for the manufacture of product for sale to the counterparties to the agreements, and the counterparties will make minimum annual purchases at a set price, subject to adjustments, all as defined in the agreements.

Our Offtake Agreements with two customers, who are Legacy Origin stockholders, allowed those customers to terminate the agreements and seek liquidated damages if specified construction and product delivery requirements are not satisfied.

One of those Offtake Agreements has been amended to eliminate these construction and product delivery requirements and the associated liquidated damages provisions. On August 1, 2022, the Company amended its Offtake Agreement and related secured promissory note with one of its customers who is a Legacy Origin stockholder. The amendment converted the customer's obligation to purchase a specified annual amount of product from Origin 1 into an option to make a one-time purchase from Origin 1 and eliminated certain construction and delivery milestones and associated liquidated damages provisions applicable in the event those milestones were not met. In addition, the amendment reflected the customer's exercise of its option to enter into a new Offtake Agreement to buy a specified annual amount of product from Origin 2 for an initial term of up to 10 years. The related promissory note was amended to make each of three fixed repayments three months earlier and to allow the customer to offset amounts due under the amended Offtake Agreement against amounts owed under the amended note.

The other Offtake Agreement continues to allow the customer to terminate the agreement and seek liquidated damages if specified requirements are not satisfied. For example, under the agreement, if Origin 1 had not commenced commercial operation by December 31, 2021 or we had not delivered specified product volume from Origin 1 by September 30, 2022, then we could be required to pay liquidated damages up to an aggregate of \$0.2 million. The customer may also terminate the agreement and any outstanding secured promissory note resulting from an advance payment made to us by that customer will become due immediately. The outstanding obligations under that promissory note, together with accrued interest, totaled an aggregate of \$5.4 million and \$5.2 million as of December 31, 2022 and 2021, respectively.

The Company believes enforcement of the liquidated damages provision under the foregoing Offtake Agreement is not probable and expects to secure amendments to this Offtake Agreement pursuant to its ongoing discussions with the customer. However, the Company cannot guarantee that it will be successful in amending this Offtake Agreement.

Stockholder Convertible Notes Payable

In November 2019, the Company entered into secured convertible note agreements ("Bridge Notes") with certain Legacy Origin preferred stockholders, whereby the Company can borrow up to \$6.0 million. The Bridge Notes bore an annual interest rate of 10% and matured on March 31, 2021, unless converted. If the Company issues shares of a new series of preferred stock prior to maturity, the outstanding principal and unpaid accrued interest will convert at 70% of the per share price of the new series of preferred stock. Upon a liquidation event, as defined in the agreements, the Company would be required to repay purchasers in cash an amount equal to 200% of the outstanding principal amount plus the outstanding principal and accrued interest. The Bridge Notes were collateralized by substantially all of the Company's assets. The conversion and liquidation features were deemed to be derivatives under ASC 815 (see Note 6) and separately measured and recognized from the Bridge Notes through a debt discount.

In January 2021, the Company amended the Bridge Notes to extend the maturity date from March 31, 2021 to September 30, 2021. The amendment also added a SPAC transaction to the conversion provision such that the Bridge Notes convert if the Company issues at least \$50 million of shares of a new series of preferred stock or closes a SPAC transaction (each a "Qualified Financing") prior to maturity. In a Qualified Financing that is a preferred stock issuance, the notes convert at 70% of the cash price paid per share for the preferred shares. In a Qualified Financing that is a SPAC transaction, the notes convert at the lesser of (i) 70% of the per share value attributed to the shares of the Company's common stock as set forth in the Merger Agreement or (ii) the per share value that would be attributed to the Company's common stock assuming a pre-transaction valuation of the Company in connection with the SPAC transaction of \$700 million. These notes fully converted into the Company common stock upon consummation of the Business Combination (see Note 4).

In February 2021 the Company issued \$10.0 million of new, unsecured convertible notes (the "Convertible Notes"). The Convertible Notes bore an annual interest rate of 8% and mature on September 30, 2021, unless converted. If the Company issues at least \$50 million worth of shares of a new series of preferred stock prior to maturity or closes a SPAC transaction (each a "Qualified Financing"), the outstanding principal and unpaid accrued interest will convert at 80% of the per share price of the new series of preferred stock or, in the case of a SPAC transaction, at 80% of the per share value attributed to the shares of the Company's common stock as set forth in the Merger Agreement. Upon a Change of Control (other than a Qualified Financing), as defined in the Convertible Notes, the Company will repay purchasers in cash an amount equal to the outstanding principal and accrued interest plus a repayment premium equal to 100% of the outstanding principal amount of the notes. Debt issuance costs are recorded against the outstanding payable balance. These notes fully converted into the Company common stock upon consummation of the Business Combination (see Note 4).

Legacy Stockholder Note

In November 2016, the Company received a \$5.0 million prepayment from a Legacy Origin stockholder for product from Origin 1 pursuant to an Offtake Agreement. The prepayment was to be credited against the purchase of products over the term of the Offtake Agreement. The prepayment was secured by a promissory note (the “Promissory Note”) to be repaid in cash in the event that the prepayment could not be credited against the purchase of product, for example, if Origin 1 was never constructed. The Promissory Note was collateralized substantially by Origin 1 and other assets of Origin Materials Canada Pioneer Limited. In May 2019, the Company and legacy stockholder amended the Offtake Agreement and Promissory Note. The amendment added accrued interest of \$0.2 million to the principal balance of the prepayment and provided for the prepayment amount to be repaid in three annual installments rather than being applied against the purchase of product from Origin 1. On August 1, 2022, the Company and legacy stockholder further amended and restated the Promissory Note with an aggregate principal amount of \$5.2 million which is the sum of the original principal with accrued interest prior to the amendment. As a result, the repayment dates were revised and to allow the Legacy Origin stockholder to offset amounts owed for the purchase of product from the Company's Origin 1 facility against amounts due under the Promissory Note. The repayment in the amount of \$2.7 million is due on September 1, 2024, \$1.9 million is due on September 1, 2025, and \$1.8 million is due on September 1, 2026 (inclusive of accrued but unpaid interest). At December 31, 2022 and 2021, the total debt principal outstanding was \$5.2 million.

Legacy Related Party Other Liabilities, Long-term

In November 2016, the Company received a \$5.0 million prepayment from a Legacy Origin stockholder for product from Origin 1 pursuant to an Offtake Agreement. The prepayment is to be credited against the purchase of products from Origin 1 over the term of the Offtake Agreement. Specifically, repayment is effected by applying a credit to product purchases each month over the first five years of operation of Origin 1 up to \$7.5 million, which is equal to 150% of the prepayment amount. If product purchases are not sufficient to recover the advances, the application of the credit to purchases as payment of the advances will continue until fully repaid. The prepayment is secured by a note to be repaid in cash in the event the prepayment cannot be credited against the purchase of product, for example, if Origin 1 is never constructed. The note is collateralized substantially by Origin 1 and other assets of Origin Materials Canada Pioneer Limited. If repaid in cash, the note bears an annual interest rate of the three-month London Interbank Offered Rate (“LIBOR”) plus 0.25% (5.02% at December 31, 2022) and matures five years from the commercial operation date of Origin 1. At December 31, 2022 and 2021 the total note principal outstanding was \$5.1 million and accrued interest outstanding was \$0.3 million and \$0.1 million, respectively.

12. Other Liabilities, Long-term

In September 2019, the Company entered into a \$5.0 million prepayment agreement with a counterparty for the purchase of products from Origin 2. The prepayment is to be made in two equal installments: the first \$2.5 million was in October 2019 and the remaining \$2.5 million is due within 30 days of the customer confirming that a sample from Origin 1 meets the customer’s specifications. The Company and customer agreed to work in good faith to execute an Offtake Agreement, the agreed terms of which are set forth in the prepayment agreement, whereby 100% of the prepayment will be applied against future purchases. The prepayment agreement provides the customer a capacity reservation of up to a specified annual volume of product from Origin 1 for a term of ten years, pursuant to the terms of an Offtake Agreement. At December 31, 2022 and 2021, the total amount outstanding on this agreement was \$2.5 million.

13. Earnout Liability

As additional consideration for the Merger, within ten (10) Business Days after the occurrence of a Triggering Event, the Company shall issue or cause to be issued to each Legacy Origin stockholder the number of shares of the Company Class A Common Stock equal to the product of (i) the number of shares of Company Common Stock, Company Series A Preferred Stock, Company Series B Preferred Stock, Company Series C Preferred Stock, and the net number of shares of Company Capital Stock that would be issuable in respect of Vested Company Options in the event such options were exercised (on a net exercise basis with respect to only the applicable exercise price, immediately prior to the Closing and settled in the applicable number of shares of Company Common Stock, rounded down to the nearest whole share) held by such Legacy Origin stockholder as of immediately prior to the Effective Time; and (ii) the Earnout Exchange Ratio (such issued shares of Artius Class A Common Stock, collectively, the “Earnout Shares”). Notwithstanding anything to the

contrary herein, in no event shall Artius be required to issue more than 25,000,000 Earnout Shares in the aggregate. A Triggering Event is defined as the following:

- (a) the volume weighted average price of Common Stock ("VWAP") equaling or exceeding \$15.00 for ten (10) consecutive trading days during the three (3) year period following the Closing Date;
- (b) the VWAP equaling or exceeding \$20.00 for ten (10) consecutive trading days during the four (4) year period following the Closing Date; or
- (c) the VWAP equaling or exceeding \$25.00 for ten (10) consecutive trading days during the five (5) year period following the Closing Date.

A Sponsor Letter Agreement was delivered in connection with the Merger such that 4.5 million of the shares held by Sponsor ("Sponsor Vesting Shares") shall be subject forfeiture based on the same vesting requirements as the Earnout Shares. These shares shall not be transferred prior to the date in which they vest. Dividends and other distributions with respect to Sponsor Vesting Shares shall be set aside by the Company and shall be paid to the Sponsor upon the vesting of such Sponsor Vesting Shares.

The Company evaluated the Earnout Liability under ASC 815-40, *Derivatives and Hedging-Contracts in Entity's Own Equity* ("ASC 815-40"), and concluded they do not meet the criteria to be classified in stockholders' equity. Specifically, there are contingent exercise provisions and settlement provisions that exist. Holders may receive differing amounts of shares depending on the company's stock price or the price paid in a change of control. It is noted that all remaining shares would be issuable (or the forfeiture provisions would lapse) upon any change of control involving the company and all remaining shares would be issuable (or the forfeiture provisions would lapse) upon a bankruptcy or insolvency of the company. This means that settlement is not solely impacted by the share price of the Company (that is, the share price observed in or implied by a qualifying change-in-control event), but also by the occurrence of a qualifying change-in-control event. This causes the arrangement to not be indexed to the Company's own shares and liability classification is appropriate. The Company recorded these instruments as liabilities on the consolidated balance sheets at fair value, with subsequent changes in their respective fair values recognized in earnings at each reporting date. The earnout liability was fair valued using a Monte Carlo open-ended model. The inputs used for the model were a dividend yield of 0%, volatility of 70%, and interest rate of 4.08%. At December 31, 2022 and 2021 the balance of the earnout liability was \$42.5 million and \$127.8 million, respectively. A gain of \$85.4 million and \$75.5 million for the year ended December 31, 2022 and 2021, respectively, was recorded on the Consolidated Statement of Operations and Comprehensive Income (Loss) in the change in the fair value of earnout liability.

14. Canadian Government Research and Development Program Liability

In April 2019, the Company entered into a contribution agreement related to the research and development and construction associated with the operation of Origin 1 in which the Company will participate in a Canadian government research and development program (the "R&D Agreement"). Pursuant to the R&D Agreement, the Company will receive funding for eligible expenditures through March 31, 2023 up to the lesser of approximately 18.48% of eligible costs and \$23.0 million (in Canadian dollars).

The funding will be repaid over 15 years after completion of Origin 1, commencing no sooner than the third fiscal year of consecutive revenues from a commercial plant, but no later than the fifth year following the earlier of (1) the year in which the Company completes construction of Origin 1 or (2) March 2023. The maximum amount to be repaid by the Company under the R&D Agreement is 1.25 times the actual funding received, subject to the following repayment ceiling formula. Repayment of the funding will be reduced by 50% if the Company begins construction before December 31, 2024 of one or more commercial plants that operate in Canada, with costs exceeding \$500.0 million (in Canadian dollars), and the plants being constructed and operational within 30 months of the final investment decision, as defined in the R&D Agreement. Once begun, repayments will be paid annually by April of each year through March 31, 2037. Payments will be determined by a formula of the funded amount based on the fiscal year gross business revenue, as defined in the R&D Agreement. At December 31, 2022 and 2021, the Company recorded a liability for the amount received of \$7.2 million and \$6.8 million, respectively, on the Consolidated Balance Sheets in Canadian government research and development program liability.

15. Assumed Common Stock Warrants

As of December 31, 2022 and 2021, there are 35,476,627 warrants outstanding.

As part of Artius's initial public offering, 24,149,960 Public Warrants were sold. The Public Warrants entitle the holder thereof to purchase one share of Common Stock at a price of \$11.50 per share, subject to adjustments. The Public Warrants may be exercised only for a whole number of shares of Common Stock. No fractional shares will be issued upon exercise of the warrants. The Public Warrants will expire on June 25, 2026 at 5:00p.m., New York City time, or earlier upon redemption or liquidation. The Public Warrants are listed on the Nasdaq under the symbol "ORGNW".

The Company may redeem the Public Warrants when exercisable, in whole and not in part, at a price of \$0.01 per warrant, so long as the Company provides not less than 30 days' prior written notice of redemption to each warrant holder, and if, and only if, the reported last sale price of the Common Stock equals or exceeds \$18.00 per share for any 20 trading days within a 30-trading day period ending on the third trading day prior to the date the Company sends the notice of redemption to the warrant holders.

Simultaneously with Artius's initial public offering, Artius consummated a private placement of 11,326,667 Private Placement Warrants with the Sponsor. The Private Placement Warrant is exercisable for one share of Class A Common Stock at a price of \$11.50 per share, subject to adjustment. The Private Placement Warrants are identical to the Public Warrants, except that: (1) the Private Placement Warrants and the shares of Class A Common Stock issuable upon exercise of the Private Placement Warrants are not transferable, assignable or salable until the earliest to occur of: (i) 365 days after the date of the Closing; (ii) the first day after the date on which the closing price of the Public Shares (or any successor securities thereto) equals or exceeds \$12.00 per share (as adjusted for stock splits, stock dividends, reorganizations, recapitalizations and the like) for any 20 trading days within any 30-trading day period commencing at least 150 days after the date of the Closing; or (iii) the date on which Artius completes a liquidation, merger, capital stock exchange, reorganization or other similar transaction that results in all of Artius's Public Shareholders having the right to exchange their Public Shares (or any successor securities thereto) for cash, securities or other property, subject to certain limited exceptions, (2) the Private Placement Warrants will be exercisable on a cashless basis and be non-redeemable, except if the reference value equals or exceeds \$10.00 and is less than \$18.00 (as described above), so long as they are held by the initial purchasers or their permitted transferees, and (3) the Private Placement Warrants and the Class A ordinary shares issuable upon exercise of the Private Placement Warrants will be entitled to registration rights. If the Private Placement Warrants are held by someone other than the initial purchasers or their permitted transferees, the Private Placement Warrants will be redeemable under all redemption scenarios by the Company and exercisable by such holders on the same basis as the Public Warrants.

The Company concluded the Public Warrants and Private Placement Warrants, or Assumed Common Stock Warrants, meet the definition of a derivative under ASC 815 and are recorded as liabilities. Upon consummation of the Business Combination, the fair value of the Assumed Common Stock Warrants was recorded on the Consolidated Balance Sheets. The fair value of the Assumed Common Stock Warrants was remeasured on the December 31, 2022 and 2021 Consolidated Balance Sheets at \$30.9 million and \$52.9 million, respectively, and a gain of \$22.0 million and \$30.5 million, respectively, was recorded on the Consolidated Statement of Operations and Comprehensive Income (Loss).

16. Stockholders' Equity

As of December 31, 2022 and 2021, 1,010,000,000 shares, \$0.0001 par value per share are authorized, of which, 1,000,000,000 shares are designated as Common Stock and 10,000,000 shares are designated as Preferred Stock.

Common Stock

Holders of the Common Stock are entitled to dividends when, as, and if, declared by the Board, subject to the rights of the holders of all classes of stock outstanding having priority rights to dividends. As of December 31, 2022, the Company had not declared any dividends. The holder of each share of Common Stock is entitled to one vote. There were 143,034,225 and 141,301,569 shares of Common Stock (including 4,500,000 Sponsor Vesting Shares not indexed to equity) outstanding as of December 31, 2022 and December 31, 2021, respectively.

Employee Stock Purchase Plan

The Company maintains an Employee Stock Purchase Plan ("ESPP"). The ESPP permits participants to purchase shares of our Common Stock with the purchase price of the shares at a price determined by our board, which shall not be less than 85% of the lower of the fair market value of our Common Stock on the first day of an offering or on the date of purchase.

Initially, following adoption of the ESPP, the maximum number of shares of our Common Stock that may be issued under the ESPP was 1,846,710. The ESPP contains an "evergreen" share reserve feature that automatically increases the number of shares of Common Stock reserved for issuance under the plan on January 1 of each year for a period of ten years commencing on January 1, 2022 and ending on (and including) January 1, 2031 in an amount equal to the lesser of (1) one percent (1%) of the fully-diluted shares of our Common Stock on December 31st of the preceding calendar year, (2) 3,693,420 of Common Stock, or (3) such lesser number of shares as determined by our board of directors. On January 1, 2022, the number of shares of Common Stock reserved for issuance under the ESPP was automatically increased by 1,875,780. As a result, as of December 31, 2022, the number of shares available for issuance under the ESPP was 3,722,490. Shares subject to purchase rights granted under the ESPP that terminate without having been exercised in full will not reduce the number of shares available for issuance under the ESPP.

To date no stock has been offered or issued to employee under the ESPP.

Equity Incentive Plans

The Company maintains the following equity incentive plans: the 2010 Stock Incentive Plan, the 2020 Equity Incentive Plan, and the 2021 Equity Incentive Plan, each as amended (together, the "Stock Plans"). Upon closing of the Business Combination, awards under the 2010 Stock Incentive Plan and 2020 Equity Incentive Plan were converted at the Exchange Ratio and the 2021 Equity Incentive Plan was adopted and approved.

Origin may grant a wide variety of equity securities under the Stock Plans, including incentive stock options, nonstatutory stock options, stock appreciation rights, restricted stock awards, RSU awards, performance-based stock awards, and other awards. The Company has granted incentive stock options, RSU awards, and performance awards under the Stock Plans. Under the Stock Plans, options must be issued at exercise prices no less than the estimated fair value of the stock on the date of grant and are exercisable for a period not exceeding 10 years from the date of grant. Options granted to employees under the Stock Plans generally vest 25% one year from the vesting commencement date and 1/36th per month thereafter, although certain arrangements call for vesting over other periods. Options granted to non-employees under the Stock Plan vest over periods determined by the Board (generally immediate to four years). RSU awards granted to employees under the 2021 Equity Incentive Plan require a service period of three years and generally vest 33.3% annually over the three-year service period. Under the Stock Plans, the fair value of RSU awards and performance-based stock awards are determined to be the grant date closing stock price. For awards with performance-based conditions, compensation is recorded once there is sufficient objective evidence the performance conditions are considered probable of being met. The performance-based stock awards are subject to vesting based on a performance-based condition and a service-based condition. The performance-based stock awards will vest in a percentage of the target number of shares between 0% and 300%, depending on the extent the performance conditions are achieved.

Initially, following adoption of the 2021 Equity Incentive Plan, there were 18,467,109 shares of Common Stock reserved for issuance under the Stock Plans. The 2021 Equity Incentive Plan contains an "evergreen" share reserve feature that automatically increases the number of shares of Common Stock reserved for issuance under the plan on January 1 of each year for a period of ten years commencing on January 1, 2022 and ending on (and including) January 1, 2031 in an amount equal to five percent (5%) of the fully-diluted Common Stock on December 31 of the preceding year unless our board acts prior to January 1 to increase the share reserve by a lesser amount. The number of shares added to the share reserve on January 1 of a given year is reduced automatically to the extent necessary to avoid causing the share reserve to exceed fifteen percent (15%) of the fully-diluted Common Stock on December 31 of the preceding year. On January 1, 2022, the number of shares of Common Stock reserved for issuance under the 2021 Equity Incentive Plan was automatically

increased by 9,378,902 shares pursuant to the 2021 Plan's "evergreen" provision. As of December 31, 2022, there were 27,846,011 shares of common stock reserved under the Stock Plans.

The following tables summarize stock option activity under the Stock Plans:

	Outstanding Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life (in years)
Balance as of December 31, 2020	8,222,710	\$ 0.19	8.30
Granted	—	—	
Exercised	(171,118)	0.42	
Forfeited / canceled	(158,735)	0.14	
Balance as of December 31, 2021	7,892,857	\$ 0.19	7.31
Granted	—	\$ —	
Exercised	(1,412,226)	0.28	
Forfeited / canceled	(9,569)	0.63	
Balance as of December 31, 2022	6,471,062	\$ 0.17	7.29
Vested and expected to vest at December 31, 2022	6,471,062		

During the year ended December 31, 2022 and 2021, the Company did not grant any stock options. As of December 31, 2022 and 2021, there were 15,728,837 and 11,285,104 awards, respectively, available for grant under the Stock Plans. As of December 31, 2022 and 2021 there were 3,588,523 and 4,130,184 exercisable options, respectively. The total intrinsic value of the options exercised during 2022 and 2021 was \$8.5 million and \$0.3 million, respectively. The intrinsic value of options exercised during each fiscal year is calculated as the difference between the market value of the stock at the time of exercise and the exercise price of the stock option. The aggregate intrinsic value of options vested and expected to vest at December 31, 2022 and 2021 were \$28.7 million and \$49.3 million, respectively. As of December 31, 2022 and 2021, the Company had stock-based compensation of \$4.7 million and \$6.6 million respectively, related to unvested stock options not yet recognized that are expected to be recognized over an estimated weighted average period of 1.7 years and 2.6 years, respectively.

The Company issued 2,920,732 of performance and market-based stock options during 2020. During the quarter ended March 31, 2021, the Company modified the vesting schedule of 529,119 of these performance and market based stock options such that vesting at 1/48th per month would commence upon signing of the Business Combination. The Company entered into the Merger Agreement on February 16, 2021 resulting in the commencement of expense recognition related to these 529,119 options during the quarter ended March 31, 2021. During the year ended December 31, 2021, stock compensation expense related to these performance and market based stock options was \$2.9 million. For the remaining 2,391,613 performance and market-based stock options, expense commenced on the close date of the Merger, June 25, 2021, as that is the date when the performance condition was achieved.

The following table summarizes the RSU award and performance-based stock award activity for the December 31, 2022 and 2021:

	Outstanding	Weighted-average grant date fair value
Unvested balance at December 31, 2020	—	\$ —
Granted - RSU awards	769,505	7.34
Granted - performance-based stock awards	2,137,500	7.35
Unvested balance at December 31, 2021	2,907,005	\$ 7.35
Granted - RSU awards	3,740,946	5.58
Granted - performance-based stock awards	505,500	5.69
RSU awards vested and converted to shares	(320,430)	7.34
Vested - performance-based stock awards	(391,575)	7.04
Forfeited - RSU awards	(36,996)	6.07
Forfeited - performance-based stock awards	(32,500)	6.23
Unvested balance at December 31, 2022	6,371,950	\$ 6.24
Expected to vest	4,153,025	

The RSU awards, which upon vesting entitles the holder to be issued on a future date the number of shares of Common Stock that is equal to the number of restricted stock units subject to the RSU awards. The total fair value of shares vested during 2022 and 2021 was \$3.6 million and zero, respectively. As of December 31, 2022, one performance condition for the granted performance-based stock awards was met, therefore performance-based award stock compensation of \$2.8 million was recorded. As of December 31, 2022, there were 2,218,925 unvested performance-based awards subject to certain performance criteria for vesting. The vesting period for RSU awards is generally three years. Total remaining compensation expense for RSU awards to be recognized under the 2021 Equity Incentive Plan is \$22.4 million as of December 31, 2022, and will be amortized on a straight-line basis over the remaining vesting periods. Total remaining compensation expense for performance-based stock awards to be recognized will be recognized over the requisite service periods once the performance-based conditions are deemed to be probable.

During the year ended December 31, 2022, 2021 and 2020, stock compensation expense of \$4.7 million, \$4.5 million and \$1.6 million, respectively, was recognized in general and administrative expenses on the Consolidated Statements of Operations and Comprehensive Income (Loss). During the year ended December 31, 2022, 2021 and 2020 stock compensation expense of \$2.5 million, \$1.3 million and \$0.1 million, respectively, was recognized in research and development expenses on the Consolidated Statements of Operations and Comprehensive Income (Loss). Total remaining compensation expense to be recognized under the Stock Plans was \$27.0 million as of December 31, 2022, and will be amortized on a straight-line basis over the remaining vesting periods of approximately 1.67 years for stock options, 2.70 years for RSU awards and over the requisite service period once considered probable for performance-based stock awards.

17. Income Taxes

Income before provision for income taxes consisted of the following:

(in thousands)	December 31, 2022	December 31, 2021
United States	\$ 81,269	\$ 43,645
International	(2,700)	(1,555)
Income before provision for income taxes	\$ 78,569	\$ 42,090

The federal and state income tax expense is summarized as follows:

(in thousands)	December 31, 2022	December 31, 2021
Current		
Federal	\$ —	\$ —
State	3	3
International	—	—
Total current tax expense	<u>\$ 3</u>	<u>\$ 3</u>
Deferred		
Federal	\$ —	\$ —
State	—	—
International	—	—
Total deferred tax expense	<u>\$ —</u>	<u>\$ —</u>
Total tax expense	<u><u>\$ 3</u></u>	<u><u>\$ 3</u></u>

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes, and operating losses and tax credit carryforwards.

The tax effects of significant items comprising the Company's deferred taxes are as follows:

(in thousands)	December 31, 2022	December 31, 2021
Deferred tax assets		
Net operating loss carryforwards	\$ 27,210	\$ 24,899
Available for Sale Securities	2,064	390
Lease liability	532	341
Other	1,580	230
Fixed assets and intangibles	25	89
Capitalized research and development costs	1,929	—
Total deferred tax assets	<u>\$ 33,340</u>	<u>\$ 25,949</u>
Deferred tax liabilities		
ROU asset	\$ (515)	\$ (344)
Fixed assets and intangibles	(479)	—
Total deferred tax liabilities	<u>\$ (994)</u>	<u>\$ (344)</u>
Valuation allowance	<u>\$ (32,346)</u>	<u>\$ (25,605)</u>
Net deferred taxes	<u><u>\$ —</u></u>	<u><u>\$ —</u></u>

ASC 740 requires that the tax benefit of net operating losses, temporary differences and credit carryforwards be recorded as an asset to the extent that management assesses that realization is more likely than not. Realization of the future tax benefits is dependent on the Company's ability to generate sufficient taxable income within the carryforward period. Because of the Company's recent history of operating losses, management believes that recognition of the deferred tax assets arising from the above mentioned future tax benefits is currently not likely to be realized and, accordingly, has provided a valuation allowance.

The valuation allowance increased by \$6.7 million and \$6.9 million for the years ended December 31, 2022 and 2021, respectively.

At December 31, 2022, we had federal net operating loss carryforwards of approximately \$110.2 million to offset future federal taxable income, with \$42.0 million available through 2037 and \$68.2 million available indefinitely. We don't have any state net operating loss carryforwards, but we had foreign net operating loss carryforwards of approximately \$8.5 million that may offset future foreign taxable income through 2042.

At December 31, 2022, the Company has research and experimentation credit carryforwards of zero for foreign tax purposes that expire after 2038.

The effective tax rate of the Company's provision (benefit) for income taxes differs from the federal statutory rate as follows:

	December 31, 2022	December 31, 2021
Statutory rate	21.0 %	21.0 %
State tax	1.1	(1.3)
Warrants, BCF, and other equity items	(28.7)	(33.3)
Valuation allowance	6.4	15.6
Other	0.7	(0.2)
Foreign rate differential	(0.2)	(0.2)
Stock-based compensation	(0.3)	(1.6)
Total	— %	— %

The effective tax rate of the Company's provision (benefit) for income taxes differs from the federal statutory rate as follows:

	December 31, 2022	December 31, 2021
Statutory rate	\$ 16,500	\$ 8,833
State tax	875	(563)
Warrants, BCF, and other equity items	(22,559)	(14,002)
Valuation allowance	5,040	6,552
Other	502	(72)
Foreign rate differential	(148)	(85)
Stock-based compensation	(207)	(660)
Total	\$ 3	\$ 3

Under certain provisions of the Internal Revenue Code of 1986, as amended, a portion of the federal and state net operating loss carryforwards may be subject to an annual utilization limitation as a result of a change in ownership of the Company. Federal and California tax laws impose significant restrictions on the utilization of net operating loss carryforwards in the event of a change in ownership of the Company, as defined by Internal Revenue Code Section 382 ("Section 382"). The Company has experienced ownership changes as defined by IRC Section 382 and the impact of those changes has been reflected in the consolidated financial statements. In addition, in the future the Company may experience ownership changes, which may limit the utilization of net operating loss carryforwards or other tax attributes.

There were no unrecognized tax benefits in the years ended December 31, 2022 and 2021. The Company files income tax returns in the United States, various US states, and Canada. All tax years remain open in all jurisdictions. The Company is not currently under examination by income tax authorities in federal, state or other foreign jurisdictions. The Company does not anticipate any significant changes within 12 months of this reporting date of its uncertain tax positions.

18. Leases

The Company leases office space and research and development space in Sacramento, California and Sarnia, Ontario under noncancelable lease agreements and leases various office equipment, warehouse space, and temporary fencing. The operating leases have remaining lease terms of one to eight years. Certain operating leases contain options to extend the lease. The Company included the periods covered by these options as we are reasonably certain to exercise the options for all leases. For leases with the option to extend on a month-to-month basis after the defined extension periods, the Company is reasonably certain to extend for the same term as related leases. As such, lease terms for all leased assets located at the same locations have the same end dates. Rent deposits relating to leases are included within other long-term assets on the Consolidated Balance Sheets.

During 2021, the Company entered into a seven-year lease agreement for office space in Sacramento, California and recorded an operating lease ROU asset of approximately \$0.9 million. Also in 2021, the Company entered into an 18-month lease agreement for office space in Sarnia, Ontario and recorded an operating lease right-of-use asset of approximately \$0.1 million. The Company also entered into certain other operating leases during 2021 which were not individually or in aggregate material to the Company's consolidated financial statements. During 2021, the Company amended two of its existing office leases in Sacramento, California. One of these amendments increased the lease payments and extended the lease agreement through October 2028. The other amendment was for an additional space which was effective early 2022 through October 2028. The Company also entered into other operating leases during 2022 which were not individually or in aggregate material to the Company's consolidated financial statements.

The Company elected the accounting policy election to account for lease and nonlease components as a single lease component for all asset classes. Further, the Company elects to recognize lease payments on short-term leases in profit or loss on straight-line basis over the lease term for all asset classes, excluding such leases from recognition requirements under Topic 842. Prior to the adoption of Topic 842 on January 1, 2021, the Company recognized operating lease costs on a straight-line basis once control of the space was achieved. Rent expense was \$0.3 million for fiscal 2020.

The components of lease cost were as follows:

(in thousands)	December 31, 2022	December 31, 2021
Operating lease cost	\$ 671	\$ 324
Variable lease cost	107	68
Total lease cost	<u>\$ 778</u>	<u>\$ 392</u>

Other information related to leases is as follows:

(in thousands)	December 31, 2022	December 31, 2021
Operating lease ROU asset (included within Lease right-of-use asset)	\$ 2,779	\$ 1,782

Weighted average remaining lease term (in years):

Operating leases	5.28	7.44
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Weighted average discount rate:

Operating leases	3.4 %	2.8 %
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(in thousands)	December 31, 2022	December 31, 2021
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from operating leases	\$ 572	\$ 271
ROU assets obtained in exchange for operating lease liabilities	\$ 1,687	\$ 2,062

To calculate the ROU assets and liabilities, the Company uses the discount rate implicit in lease agreements when available. When the implicit discount rates are not readily determinable, the Company uses the incremental borrowing rate, determined as of the date of adoption for Topic 842. This rate was determined for individual leases based on available information regarding jurisdiction, lease term, and asset class. Further, the interest environment was considered, including analysis of benchmark rates from promissory notes, credit curve yields for bonds, and synthetic curves based on discount margin spreads.

Maturities of lease liabilities as of December 31, 2022 were as follows:

(in thousands)	December 31, 2022
2023	\$ 703
2024	563
2025	465
2026	479
2027	493
Thereafter	422
Total lease payments	3,125
Less: imputed interest	(257)
Less: lease liabilities, current	(619)
Lease liabilities, non-current	<u>\$ 2,249</u>

19. Commitments and Contingencies

Commitments

In connection with the closing of the Business Combination, the Company entered into the Investor Rights Agreement on June 25, 2021 (the "Investor Rights Agreement"), pursuant to which the holders of Registrable Securities (as defined therein) became entitled to, among other things, customary registration rights, including demand, piggy-back and shelf registration rights. The Investor Rights Agreement also provides that the Company will pay certain expenses relating to such registrations and indemnify the registration rights holders against (or make contributions in respect of) certain liabilities which may arise under the Securities Act. On July 15, 2021, the Company registered the Registrable Securities for resale pursuant to a Registration Statement on Form S-1, as amended (File No. 333-257931), which became effective on July 30, 2021. The Company filed Post-Effective Amendment No. 2 to the Registration Statement on Form S-1 on Form S-3 (File No. 333-257931), which became effective on August 8, 2022.

In May 2018, the Company executed operating and maintenance agreements for certain services, to facilitate the development and thus bring Origin 1 to the condition necessary for its intended use, commencing in different periods between July 2018 and September 2019, and all generally for five-year periods. The agreements are generally automatically extended for one-year periods thereafter. The agreements include annual fixed payments subject to escalation clauses at the beginning of each calendar year, as defined in the agreement. The minimum fixed payments are \$0.4 million per year over the fixed term. Certain of the agreements include quantities that are based on volumes, as defined in the applicable agreements. The Company is also responsible for applicable taxes under these agreements. The total amount capitalized into Property, Plant and Equipment, Net under the agreement was \$1.5 million and \$0.4 million during the year ended December 31, 2022 and 2021, respectively.

In May 2019, the Company also concurrently executed a take-or-pay steam supply agreement commencing by October 1, 2019, through December 31, 2022, whereby the Company will receive up to 25% for the first year and 50% thereafter of the steam generated, up to 140,000 MMBTUs per year. The price paid for the steam is based on a fixed amount plus the supplier's cost of natural gas, as defined in the agreement. The total amount capitalized into Property, Plant and Equipment, Net under the agreement was \$0.6 million and \$0.3 million during the year ended December 31, 2022 and 2021, respectively.

From time to time the Company enters into a joint development agreement (the "JDA") with unrelated third parties to assist in the development of various products and processes. The agreements range from two to three years. There were no expenses under these agreements for the year ended December 31, 2022, 2021 or 2020.

In July 2017, the Company entered into a nonexclusive patent license agreement for \$0.1 million, which expires upon expiration of the last to expire of the licensed patents. Under this agreement, the Company will pay less than \$0.1 million minimum royalty payments per year and, if the Company develops and sells certain products based on the licensed patents. Certain products that Origin is currently developing and anticipates selling are expected to utilize these patents.

In December 2016, the Company entered into a patent license agreement for \$0.5 million, which expires upon expiration of the last to expire of the licensed patents. Under this agreement, if the Company develops and sells specific products based on the patents, the Company would pay a royalty up to a cumulative \$0.5 million from Origin 1, whereby no further payments will be due for any production at Origin 1. If production of those products occurs at subsequent facilities, the Company will pay an upfront license fee royalty and a variable royalty based on production at that subsequent facility, capped at an aggregate \$10 million per facility. Certain products that the Company is currently developing and anticipates selling are expected to utilize these patents. No payments were made during the year ended December 31, 2022, 2021 or 2020.

In November 2016, the Company entered into a nonexclusive patent license agreement, which expires upon expiration of the patent. Under this agreement, if the Company produces products based on the patent, the Company will pay an annual royalty upon commencement of operations on Origin 1 which will not exceed \$1.0 million cumulatively. The pipeline of Company products and sales are not currently expected to be subject to this patent. The annual royalty payments is less than \$0.1 million.

In September 2011, the Company entered into a nonexclusive patent license agreement, which expires upon expiration of the patent. Under this agreement, if the Company develops and sells specific products based on the patent, the Company would pay a royalty up to \$2.0 million per year and \$10.0 million in the aggregate. Certain products that the Company is currently developing and anticipates selling are expected to utilize these patents. No payments were made during the year ended December 31, 2022, 2021 or 2020.

In June 2011, the Company entered into a nonexclusive patent license agreement, which expires upon expiration of the licensed patent. Under this agreement, the Company pays less than \$0.1 million royalty fee annually and if the Company develops and sells specific products based on the patent, 0.4% of net sales. The pipeline of Company products and sales are not currently expected to be subject to this patent.

In February 2023, the Company entered into a nonexclusive patent license agreement for use in connection with production at a specific licensed facility. The license expires upon cessation of production at that facility. The Company made a nonrefundable €5 million deposit in 2022 toward securing the license and, as a result of signing the license agreement, will make an additional payment of €7.5 million and may make additional payments depending on the achievement of certain milestones. In connection with this license, the Company entered into a conditional offtake agreement under which the licensor will supply the Company from its plants with a certain amount of the same type of products to be produced at the licensed facility in order to accelerate market development for these products and related applications.

Contingencies

At times there may be claims and legal proceedings generally incidental to the normal course of business that are pending or threatened against the Company. Although the Company cannot predict the outcome of these matters when they arise, in the opinion of management, any liability arising from them will not have a material adverse effect on the consolidated financial position, results of operations, or liquidity of the Company. At December 31, 2022 and December 31, 2021, there were no claims or legal proceedings pending or threatened against the Company.

20. Basic and Diluted Net Income (Loss) Per Share

The following table sets forth the computation of basic and diluted net income (loss) per share attributable to common stockholders, which excludes Sponsor Vesting Shares which are legally outstanding, but subject to return to the Company. Basic net income (loss) per share is computed by dividing net income (loss) for the period by the weighted-average number of common shares outstanding during the period. Diluted net income (loss) per share is computed by dividing net income (loss) for the period by the weighted-average number of common shares outstanding during the period, plus the dilutive effect of the stock options, RSU awards, and convertible preferred stock warrants, as applicable pursuant to the treasury stock method, and the convertible notes, as applicable pursuant to the if-converted method. The following table sets forth the computation of basic and diluted net income (loss) per share:

(In thousands, except for share and per share amounts)

	Year Ended December 31,		
	2022	2021	2020
Numerator:			
Net income (loss) attributable to common stockholders—Basic	\$ 78,569	\$ 42,090	\$ (30,302)
Net income (loss) attributable to common stockholders—Diluted	\$ 78,569	\$ 42,090	\$ (30,302)
Denominator:			
Weighted-average common shares outstanding—Basic ⁽¹⁾	137,563,877	101,221,781	62,544,933
Stock options	4,571,301	4,954,919	—
RSU awards	11,589	61,054	—
Weighted-average common shares outstanding—Diluted ⁽¹⁾	142,146,767	106,237,754	62,544,933
Net income (loss) per share—Basic	\$ 0.57	\$ 0.42	\$ (0.48)
Net income (loss) per share—Diluted	\$ 0.55	\$ 0.40	\$ (0.48)

(1) Excludes weighted-average Sponsor Vesting Shares subject to return of 4,500,000 and 2,342,466 shares for the year ended December 31, 2022 and 2021, respectively.

Diluted earnings per share reflect the potential dilution of securities that could share in the earnings of an entity. The following potentially dilutive securities for common stock were outstanding and excluded from diluted earnings per share as they are subject to performance or market conditions that were not achieved as follows:

	Year Ended December 31,		
	2022	2021	2020
Options to purchase common stock	1,481,531	1,481,531	—
Performance-based stock awards	2,218,925	2,137,500	—
Earnout shares	25,000,000	25,000,000	—
Sponsor vesting shares	4,500,000	4,500,000	—

The following outstanding shares of potentially dilutive securities were excluded from the computation of diluted net income (loss) per share attributable to common stockholders for the periods presented because including them would have been antidilutive:

	Year Ended December 31,		
	2022	2021	2020
Options to purchase common stock	—	—	8,222,710
Warrants to purchase common stock	35,476,667	35,476,667	—
Warrants to purchase redeemable convertible preferred stock, as-converted	—	2,678,320	5,554,470

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

None.

Item 9A. Controls and Procedures

Limitations on Effectiveness of Controls and Procedures

In designing and evaluating our “disclosure controls and procedures,” as such term is defined in Rule 13a-15(e) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and “internal controls over financial reporting,” as such term is defined in Rule 13a-15(f) under the Exchange Act, our management, including our Co-Chief Executive Officers and Chief Financial Officer, believe that our disclosure controls and procedures and our internal control over financial reporting are designed to provide reasonable assurance of achieving their objectives and are effective at the reasonable assurance level. Our management does not expect that our disclosure controls and procedures or our internal control over financial reporting will prevent all errors and all instances of fraud. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control deficiencies and instances of fraud, if any, have been detected. The design of any system of controls also is based partly on certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions.

Evaluation of Disclosure Controls and Procedures

Our management, under the direction of our Co-Chief Executive Officers and Chief Financial Officer, has evaluated the effectiveness of the design and operation of our disclosure controls and procedures as of the period covered by this Annual Report on Form 10-K. Based on this evaluation, our management, including our Co-Chief Executive Officers and Chief Financial Officer, has concluded that, as of December 31, 2022, our disclosure controls and procedures were effective at the reasonable assurance level.

Management's Annual Report on Internal Controls Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Our management, under the supervision and with the participation of our Co-Chief Executive Officers and Chief Financial Officer, conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2022. In making this evaluation, our management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in Internal Control—Integrated Framework (2013). Based upon the results of its evaluation, our management concluded that, as of December 31, 2022, our internal control over financial reporting was effective.

The effectiveness of our internal control over financial reporting as of December 31, 2022 has been audited by Grant Thornton LLP, an independent registered public accounting firm, as stated in its report which is included in Part II, Item 8. “Financial Statements” of this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

There has been no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the fourth quarter of the fiscal year ended December 31, 2022 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

Not applicable.

Part III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this item is incorporated by reference to the information to be set forth in our Proxy Statement for the 2023 annual meeting of stockholders to be filed with the SEC within 120 days after the end of our fiscal year ended December 31, 2022.

Item 11. Executive Compensation

The information required by this item is incorporated by reference to the information to be set forth in our Proxy Statement.

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

The information required by this item is incorporated by reference to the information to be set forth in our Proxy Statement.

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

The information required by this item is incorporated by reference to the information to be set forth in our Proxy Statement.

Item 14. Principal Accounting Fees and Services

The information required by this item is incorporated by reference to the information to be set forth in our Proxy Statement.

Part IV

Item 15. Exhibit and Financial Statement Schedules

(a) Exhibits.

The exhibits listed below are filed as part of this registration statement

Exhibit No.	Description	Form	Incorporated by Reference		
			File No.	Exhibit	Filing Date
2.1+	Agreement and Plan of Merger, dated as of February 16, 2021.	S-4/A	333-254012	2.1	May 25, 2021
2.2	Letter Agreement, dated as of March 5, 2021.	S-4/A	333-254012	2.2	May 25, 2021
3.1	Amended and Restated Certificate of Incorporation of the Company.	8-K	001-39378	3.3	July 1, 2021
3.2	Bylaws of the Company.	8-K	001-39378	3.2	June 29, 2021
4.1	Specimen Common Stock Certificate of the Company.	S-4/A	333-254012	4.4	May 25, 2021
4.2	Specimen Warrant Certificate of the Company.	S-1/A	333-239421	4.3	July 2, 2020

4.3	<u>Warrant Agreement between the Company and Continental Stock Transfer & Trust Company, dated July 13, 2020.</u>	8-K	001-39378	4.1	July 16, 2020
4.4	<u>Certificate of Corporate Domestication of Artius.</u>	S-4/A	333-254012	4.6	May 25, 2021
4.5	<u>Description of Securities.</u>	10-K	001-39378	4.5	March 1, 2022
10.1#	<u>Form of Performance Stock Unit Agreement under the Origin Materials 2021 Equity Incentive Plan</u>	10-Q	001-39378	10.1	November 12, 2021
10.2#	<u>Form of Restricted Stock Unit Agreement under the Origin Materials 2021 Equity Incentive Plan</u>	10-Q	001-39378	10.2	November 12, 2021
10.3#	<u>Form of Director Stock Unit Agreement under the Origin Materials 2021 Equity Incentive Plan</u>	10-Q	001-39378	10.3	November 12, 2021
10.4*	<u>Amendment No. 1 to Offtake Supply Agreement by and between Origin Materials Inc. and Danone Asia Pte Ltd. dated August 1, 2022</u>	10-K	001-39378	10.4	February 23, 2023
10.5	<u>Investor Rights Agreement, by and between the Company and certain stockholders, dated June 25, 2021.</u>	8-K	001-39378	10.5	June 25, 2021
10.6#	<u>Form of Indemnification Agreement.</u>	8-K	001-39378	10.6	June 25, 2021
10.7#	<u>Non-Employee Director Compensation Policy.</u>	8-K	001-39378	10.7	June 25, 2021
10.8#	<u>Micromidas, Inc. 2010 Stock Incentive Plan, as amended.</u>	S-4/A	333-254012	10.1	May 25, 2021
10.9#	<u>Forms of Incentive Stock Option Award Notice, Incentive Stock Option Award Agreement, Exercise Notice and Investment Representation Statement under the 2010 Stock Incentive Plan.</u>	S-4/A	333-254012	10.2	May 25, 2021
10.10#	<u>Micromidas, Inc. 2020 Equity Incentive Plan.</u>	S-4/A	333-254012	10.3	May 25, 2021
10.11#	<u>Forms of Stock Option Grant Notice, Option Agreement and Exercise Notice under the 2020 Equity Incentive Plan.</u>	S-4/A	333-254012	10.4	May 25, 2021
10.12#	<u>Origin Materials 2021 Equity Incentive Plan.</u>	8-K	001-39378	10.12	June 25, 2021
10.13#	<u>Form of Stock Option Grant Notice, Stock Option Agreement, Restricted Stock Unit Grant Notice and Restricted Stock Unit Award Agreement under the 2021 Equity Incentive Plan.</u>	8-K	001-39378	10.13	June 25, 2021
10.14#	<u>Origin Materials 2021 Employee Stock Purchase Plan.</u>	8-K	001-39378	10.14	June 25, 2021
10.15#	<u>Offer Letter, dated October 28, 2020, by and between Micromidas, Inc. and Rich Riley.</u>	S-4/A	333-254012	10.7	May 25, 2021
10.16#	<u>Offer Letter, dated January 9, 2018, by and between Micromidas, Inc. and Joshua Lee.</u>	S-4/A	333-254012	10.8	May 25, 2021
10.17#	<u>Offer Letter, dated August 11, 2020, by and between Micromidas, Inc. and Nate Whaley.</u>	S-4/A	333-254012	10.9	May 25, 2021
10.18	<u>Standard Industrial/Commercial Multi-Tenant Lease for 930 Riverside Parkway, Suites 10-30, West Sacramento, CA 95605, by and between Harsch Investment Properties, LLC and Micromidas, Inc., dated May 22, 2020.</u>	S-4/A	333-254012	10.10	May 25, 2021
10.19	<u>Standard Industrial/Commercial Multi-Tenant Lease for 970 Riverside Parkway, Suite 40, West Sacramento, CA 95605, by and between Harsch Investment Properties, LLC and Micromidas, Inc., dated February 28, 2013.</u>	S-4/A	333-254012	10.11	May 25, 2021

10.20	<u>Second Amendment to Lease for 970 Riverside Parkway, Suite 40, West Sacramento, CA 95605, by and between Harsch Investment Properties, LLC and Micromidas, Inc., dated May 11, 2015.</u>	S-4/A	333-254012	10.12	May 25, 2021
10.21	<u>Third Amendment to Lease for 970 Riverside Parkway, Suite 40, West Sacramento, CA 95605, by and between Harsch Investment Properties, LLC and Micromidas, Inc., dated May 22, 2020.</u>	S-4/A	333-254012	10.13	May 25, 2021
10.22	<u>Form of Sponsor Letter Agreement.</u>	S-4/A	333-254012	10.16	May 25, 2021
10.23	<u>Private Placement Warrants Purchase Agreement between the Company and Artius Acquisition Partners LLC.</u>				
		8-K	001-39378	10.3	July 16, 2020
10.24	<u>Amended and Restated Secured Promissory Note, by and among Micromidas, Inc., Origin Materials Canada Holding Limited, Origin Materials Canada Pioneer Limited and Danone Asia Pte Ltd, dated May 17, 2019.</u>	S-4/A	333-254012	10.33	May 25, 2021
10.25	<u>First Amendment to Amended and Restated Secured Promissory Note, by and among Micromidas, Inc., Origin Materials Canada Holding Limited, Origin Materials Canada Pioneer Limited and Danone Asia Pte Ltd, dated November 8, 2019.</u>	S-4/A	333-254012	10.34	May 25, 2021
10.26	<u>Second Amendment to Amended and Restated Secured Promissory Note, by and among Micromidas, Inc., Origin Materials Canada Holding Limited, Origin Materials Canada Pioneer Limited and Danone Asia Pte Ltd, dated May 21, 2020.</u>	S-4/A	333-254012	10.35	May 25, 2021
10.27	<u>Third Amendment to Amended and Restated Secured Promissory Note, by and among Micromidas, Inc., Origin Materials Canada Holding Limited, Origin Materials Canada Pioneer Limited and Danone Asia Pte Ltd, dated January 22, 2021.</u>	S-4/A	333-254012	10.36	May 25, 2021
10.28	<u>Amended and Restated Secured Promissory Note, by and among Micromidas, Inc., Origin Materials Canada Holding Limited, Origin Materials Canada Pioneer Limited and Nestle Waters Management & Technology, dated May 23, 2019.</u>	S-4/A	333-254012	10.37	May 25, 2021
10.29	<u>First Amended and Restated Secured Promissory Note, by and among Micromidas, Inc., Origin Materials Canada Holding Limited, Origin Materials Canada Pioneer Limited and Nestle Waters Management & Technology, dated November 8, 2019.</u>	S-4/A	333-254012	10.38	May 25, 2021
10.30	<u>Second Amended and Restated Secured Promissory Note, by and among Micromidas, Inc., Origin Materials Canada Holding Limited, Origin Materials Canada Pioneer Limited and Nestle Waters Management & Technology, dated May 21, 2020.</u>	S-4/A	333-254012	10.39	May 25, 2021
10.31	<u>Third Amended and Restated Secured Promissory Note, by and among Micromidas, Inc., Origin Materials Canada Holding Limited, Origin Materials Canada Pioneer Limited and Nestle Waters Management & Technology, dated January 27, 2021.</u>	S-4/A	333-254012	10.40	May 25, 2021

10.32+^	Offtake Supply Agreement, by and between Micromidas, Inc. and Pepsi-Cola Advertising and Marketing, Inc., dated August 3, 2018.	S-4/A	333-254012	10.42	May 25, 2021
10.33^	Amendment No. 1 to Offtake Supply Agreement, by and between Micromidas, Inc. and Pepsi-Cola Advertising and Marketing, Inc., dated October 24, 2019.	S-4/A	333-254012	10.43	May 25, 2021
10.34+^	Amended and Restated Offtake Supply Agreement, by and between Micromidas, Inc. and Danone Asia Pte Ltd, dated May 17, 2019.	S-4/A	333-254012	10.44	May 25, 2021
10.35+^	Amended and Restated Offtake Supply Agreement, by and between Micromidas, Inc. and Nestle Waters Management & Technology, dated May 23, 2019.	S-4/A	333-254012	10.45	May 25, 2021
10.36+^	Offtake Supply Agreement, by and between Micromidas, Inc. and Packaging Equity Holdings, LLC, dated December 13, 2020.	S-4/A	333-254012	10.46	May 25, 2021
10.37+^	Offtake Supply Agreement (Origin 2) by and between Origin Materials Operating, Inc. and Danone Asia Pte Ltd, dated August 1, 2022	POS-AM	333-257931	10.51	August 3, 2022
10.38+^	Fourth Amendment to Amended and Restated Secured Promissory Note by and between Origin Materials Operating, Inc. and Danone Asia Pte Ltd, Origin Materials Canada Holding Limited, and Origin Materials Canada Pioneer Limited, dated August 1, 2022	POS-AM	333-257931	10.52	August 3, 2022
16.1	Letter from Marcum LLP.	8-K	001-39378	16.1	July 1, 2021
23.1*	Consent of Grant Thornton LLP, independent registered public accounting firm.				
24.1*	Power of Attorney (included on signature page).				
31.1*	Certification of Co-Principal Executive Officer pursuant to Rules 13a-14(a) and 15d-14(a) promulgated under the Securities Exchange Act of 1934, as amended.				
31.2*	Certification of Co-Principal Executive Officer pursuant to Rules 13a-14(a) and 15d-14(a) promulgated under the Securities Exchange Act of 1934, as amended.				
31.3*	Certification of Principal Financial Officer pursuant to Rules 13a-14(a) and 15d-14(a) promulgated under the Securities Exchange Act of 1934, as amended.				
32.1*+	Certification of Co-Principal Executive Officers and Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.				
101.INS*	XBRL Instance Document				
101.SCH*	XBRL Taxonomy Extension Schema Document				
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase Document				

101.DEF* XBRL Taxonomy Extension Definitions Linkbase
Document

101.LAB* XBRL Taxonomy Extension Label Linkbase
Document

101.PRE* XBRL Taxonomy Extension Label Linkbase
Document

104 Cover Page Interactive Data File (formatted as
Inline XBRL and contained in Exhibit 101)

* Filed herewith.

^ Certain confidential portions (indicated by brackets and asterisks) have been omitted from this exhibit in accordance with the rules of the Securities and Exchange Commission.

+ Schedules and exhibits have been omitted pursuant to Items 601(a)(5) and 601(b)(2) of Regulation S-K. The Company agrees to furnish supplementally a copy of any omitted schedule or exhibit to the SEC upon request.

Indicates a management or compensatory plan

+ Furnished herewith and not deemed to be “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, and shall not be deemed to be incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended.

(b) Financial Statement Schedules.

Schedules not listed above have been omitted because the information required to be set forth therein is not applicable or is shown in the financial statements or notes thereto.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

ORIGIN MATERIALS, INC.

Date: February 23, 2023

By: /s/ John Bissell

John Bissell

Co-Chief Executive Officer

(Co-Principal Executive Officer)

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints John Bissell, Rich Riley and Nate Whaley, and each of them, his or her true and lawful attorneys-in-fact and agents, each with full power of substitution and resubstitution, for him or her and in his or her name, place and stead, in any and all capacities, to do any and all things and execute any and all instruments that such attorney may deem necessary or advisable under the Securities Exchange Act of 1934, as amended, and any rules, regulations and requirements of the Securities and Exchange Commission in connection with this Annual Report and any and all amendments hereto, as fully and for all intents and purposes as he or she might do or could do in person, and hereby ratifies and confirms all that each of said attorneys-in-fact and agents, or his or her substitute or substitutes may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Annual Report has been signed below by the following persons on behalf of the registrant in the capacities and on the dates indicated.

Signature	Title	Date
<u>/s/ John Bissell</u> John Bissell	Co-Chief Executive Officer and Director (Co-Principal Executive Officer)	February 23, 2023
<u>/s/ Rich Riley</u> Rich Riley	Co-Chief Executive Officer and Director (Co-Principal Executive Officer)	February 23, 2023
<u>/s/ Nate Whaley</u> Nate Whaley	Chief Financial Officer (Principal Financial and Accounting Officer)	February 23, 2023
<u>/s/ Karen Richardson</u> Karen Richardson	Chairperson of the Board	February 23, 2023
<u>/s/ Benno O. Dorer</u> Benno O. Dorer	Director	February 23, 2023
<u>/s/ Charles Drucker</u> Charles Drucker	Director	February 23, 2023
<u>/s/ Kathleen B. Fish</u> Kathleen B. Fish	Director	February 23, 2023
<u>/s/ William Harvey</u> William Harvey	Director	February 23, 2023
<u>/s/ Boon Sim</u> Boon Sim	Director	February 23, 2023
<u>/s/ Pia Heidenmark Cook</u> Pia Heidenmark Cook	Director	February 23, 2023

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We have issued our reports dated February 23, 2023, with respect to the consolidated financial statements and internal control over financial reporting included in the Annual Report of Origin Materials, Inc. on Form 10-K for the year ended December 31, 2022. We consent to the incorporation by reference of said reports in the Registration Statements of Origin Materials, Inc. on Forms S-8 (File No. 333-259147 and File No. 333-264798).

/s/ GRANT THORNTON LLP

San Jose, California

February 23, 2023

**CERTIFICATION PURSUANT TO
RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, John Bissell, certify that:

1. I have reviewed this Annual Report on Form 10-K of Origin Materials, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 23, 2023

By: /s/ John Bissell

John Bissell

Co-Chief Executive Officer

(Co-Principal Executive Officer)

**CERTIFICATION PURSUANT TO
RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Rich Riley, certify that:

1. I have reviewed this Annual Report on Form 10-K of Origin Materials, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 23, 2023

By: /s/ Rich Riley

Rich Riley

Co-Chief Executive Officer

(Co-Principal Executive Officer)

**CERTIFICATION PURSUANT TO
RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Nate Whaley, certify that:

1. I have reviewed this Annual Report on Form 10-K of Origin Materials, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 23, 2023

By: /s/ Nate Whaley

Nate Whaley

Chief Financial Officer

(Principal Financial Officer)

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

Pursuant to the requirement set forth in Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended (the “Exchange Act”) and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. § 1350), John Bissell, Co-Chief Executive Officer of Origin Materials, Inc. (the “Company”), Rich Riley, Co-Chief Executive Officer of the Company, and Nate Whaley, Chief Financial Officer of the Company, each hereby certifies, that, to the best of their knowledge:

1. The Company’s Annual Report on Form 10-K for the fiscal year ended December 31, 2022, to which this Certification is attached as Exhibit 32.1 (the “Annual Report”), fully complies with the requirements of Section 13(a) or Section 15(d) of the Exchange Act; and
2. The information contained in the Annual Report fairly presents, in all material respects, the financial condition and result of operations of the Company.

Date: February 23, 2023

By: /s/ John Bissell

John Bissell

Co-Chief Executive Officer

(Co-Principal Executive Officer)

By: /s/ Rich Riley

Rich Riley

Co-Chief Executive Officer

(Co-Principal Executive Officer)

By: /s/ Nate Whaley

Nate Whaley

Chief Financial Officer

(Principal Financial Officer)

This certification accompanies the Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Origin Materials, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing.