



aspen|aerogels®

2023 ANNUAL REPORT

CREATING VALUE THROUGH TECHNOLOGY, INNOVATION, AND EXECUTION

Dear Stakeholders,

In 2023, we set the stage for significant value creation in our Thermal Barrier and Energy Industrial businesses. Over the past year, teams across Aspen came together to scale business operations, drive innovation, eliminate the capacity constraints in our Energy Industrial business, and increase market adoption of our high-performance thermal barrier solutions. These successful initiatives played a pivotal role in our 2023 financial and operational progress. Our PyroThin[®] thermal barrier business achieved record annual revenues, reaching an impressive \$110 million for the year, nearly doubling the segment's revenue generation compared to 2022. In addition, we continued to diversify our customer base in this segment, signing contracts with three new major automotive OEMs. Equally impressive, our Energy Industrial business, which faced capacity constraints through the year, still demonstrated year-over-year growth, and exited 2023 with a meaningful backlog of orders to fulfill throughout 2024.

These results bode well for 2024 and beyond and are important indicators of the successful execution of our multi-year strategy to build a profitable growth engine that benefits all stakeholders: employees, customers, suppliers, communities, and investors alike.

2023 Highlights and Recent Business Developments

During the year 2023, the company focused on driving top line growth from both business segments, improving productivity and yields, maintaining careful control of operating expenses, optimizing the timing of capital expenditures, and accelerating on the path to near-term profitability.

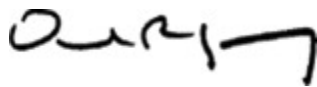
- Grew record consolidated revenue 32% year-over-year to \$238.7 million.
- Generated record PyroThin thermal barrier revenue of \$110.1 million, up 98% year-over-year.
- Delivered Energy Industrial revenues of \$128.6 million, despite being capacity constrained, and initiated deliveries from our external manufacturing facility.
- Recorded 2023 gross margins of 24%, with a quarterly progression from 11% in Q1 to 17% in Q2, 23% in Q3, and 35% in Q4.
- Delivered record company profitability in Q4 2023, where \$84.2 million in quarterly revenue enabled gross margins of 35% and operating income of \$1.4 million.
- Secured PyroThin award with Audi, a luxury brand of the Volkswagen Group, to supply a vehicle platform with start of vehicle production expected in 2025.
- Awarded PyroThin contract from Scania, a commercial vehicle division of the Volkswagen Group, for a commercial truck nameplate with start of production expected in 2024.
- Announced PyroThin award from The Automotive Cells Company (“ACC”), a battery cell joint-venture between Stellantis N.V., Saft-TotalEnergies, and Mercedes-Benz, to supply the Stellantis STLA Medium vehicle platform with an expected start of production in 2025.

- Announced the right-timing of our second aerogel manufacturing facility in Statesboro, Georgia to better align with the expected ramp of our EV customers.
- Completed \$75 million registered direct offering of common stock at \$12.375 per share in December 2023.
- Ended the year with cash and equivalents of \$139.7 million and believe that we are fully funded to deliver on our near-term operating plans.
- Invited into the formal due diligence and term sheet negotiation phase by the U.S. Department of Energy ("DOE") Loan Programs Office ("LPO") for the company's pending application seeking a loan pursuant to the DOE LPO's Advanced Technology Vehicles Manufacturing ("ATVM") for re-accelerating construction of our Second Aerogel Plant in Statesboro, GA. The DOE's continued evaluation of the application is not an assurance that the terms and conditions of a term sheet will be consistent with terms proposed by the applicant. The foregoing matters are wholly dependent on the results of DOE review and evaluation, and DOE's determination whether to proceed.
- For the second consecutive year, Aspen was awarded a Silver Medal rating from EcoVadis for its overall sustainability scorecard, placing Aspen in the 85th percentile of companies assessed by EcoVadis.

Amidst the uncertainties of today's global macroeconomic landscape, our focus on profitability remains top priority. To this point, we are steadfast in managing our fixed cost base, optimizing our current assets, executing against our quoted customer pipeline, and leveraging our supply partner to unlock additional capacity. We are well positioned to capture several industry tailwinds that have unfolded due to the global electrification movement and increasing demands for energy security.

Without our great team here at Aspen, none of this success would be possible. On behalf of the entire management team, I extend our deepest gratitude for your unwavering trust, confidence, and support. We remain committed to upholding the highest ethical standards in our relationships with all stakeholders, striving to exceed your expectations at every turn along the way.

Sincerely,



Donald R. Young

President & Chief Executive Officer



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, 2023
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: 001-36481

ASPEN AEROGELS, INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)
30 Forbes Road, Building B
Northborough, Massachusetts
(Address of principal executive offices)

04-3559972
(I.R.S. Employer
Identification No.)

01532
(Zip Code)

Registrant's telephone number, including area code (508) 691-1111
Securities registered pursuant to Section 12(b) of the Exchange Act:

| Title of each class | Trading Symbol | Name of exchange on which registered |
|---|----------------|--------------------------------------|
| Common Stock, par value \$0.00001 per share | ASPN | New York Stock Exchange |

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

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

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

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (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, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer", "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

| | | | |
|-------------------------|--------------------------|---------------------------|-------------------------------------|
| Large accelerated filer | <input type="checkbox"/> | Accelerated filer | <input checked="" 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, indicated 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 Act). Yes ☐ No ☒

The aggregate market value of the registrant's common stock held by non-affiliates of the registrant (without admitting that any person whose shares are not included in such calculation is an affiliate) computed by reference to the price at which the common stock was last sold as of the last business day of the registrant's most recently completed second fiscal quarter was approximately \$454.8 million.

As of March 5, 2024, the registrant had 76,664,530 shares of common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement for its Annual Meeting of Stockholders to be held on May 30, 2024 are incorporated by reference into Part III of this Annual Report on Form 10-K to the extent stated herein.

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|------------------|-----|---------------|----------|-------------------|--------------------------------------|
| Auditor Firm Id: | 185 | Auditor Name: | KPMG LLP | Auditor Location: | Boston, MA, United States of America |
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PART I

Item 1. BUSINESS

When used in this report, the terms “we,” “us,” “our” and “the Company” refer to Aspen Aerogels, Inc. and its subsidiaries.

Aspen Aerogels, Inc. is an aerogel technology company that designs, develops and manufactures innovative, high-performance aerogel materials used primarily in the energy industrial, sustainable insulation materials and electric vehicle (EV) markets. We have provided high-performance aerogel insulation to the energy industrial and sustainable insulation markets for nearly two decades. We have developed and commercialized our proprietary line of PyroThin® aerogel thermal barriers for use in battery packs in EVs. In addition, we are developing applications for our aerogel technology in the battery materials market and a number of other high-potential markets. Our core businesses are organized into two reportable segments: Energy Industrial and Thermal Barrier. The following describes our key product offerings and new product innovations by reportable segment.

Energy Industrial

We design, develop and manufacture innovative, high-performance aerogel insulation used primarily in the energy industrial and sustainable insulation markets. We believe our aerogel blankets deliver the best thermal performance of any widely used insulation product available on the market today and provide a combination of performance attributes unmatched by traditional insulation materials. Our end-user customers select our products where thermal performance is critical and to save money, improve resource efficiency, enhance sustainability, preserve operating assets, and protect workers.

Our technologically advanced insulation products are principally targeted at the multi-billion dollar global market for energy industrial insulation materials. Our aerogel insulation has undergone rigorous technical validation and is used by many of the world’s largest oil producers and the owners and operators of refineries, petrochemical plants, liquefied natural gas facilities and power generating and distribution assets, such as ExxonMobil, Reliance Industries, PTT LNG, and Royal Dutch Shell. Our products replace traditional insulation in existing facilities during regular maintenance, upgrades and capacity expansions. In addition, our aerogel products are increasingly being specified for use in new-build energy industrial facilities.

We introduced our two key aerogel insulation product lines for the energy industrial market, Pyrogel® and Cryogel®, in 2008. Pyrogel and Cryogel have undergone rigorous technical validation by industry-leading end-users and achieved significant market adoption. Our insulation product revenue has grown from \$17.2 million in 2008 to \$128.6 million in 2023, representing a compound annual growth rate of 14%. During this period, we have sold over \$1.4 billion of our insulation products globally, representing an installed base of more than 475 million square feet of insulation. We believe that our long-term record of success positions us for future growth and continued gain in market share in the energy industrial and sustainable insulation markets.

We have grown our business by forming technical and commercial relationships with industry leaders, which has allowed us to optimize our products to meet the particular demands of targeted market sectors. We have benefited from our technical and commercial relationships with ExxonMobil in the oil refinery and petrochemical sector, and with TechnipFMC in the offshore oil sector. We will continue our strategy of working with innovative companies to target and penetrate additional opportunities in the energy industrial and sustainable insulation materials markets.

Thermal Barrier

We are actively developing a number of promising aerogel products and technologies for the EV market. Our PyroThin product is an ultra-thin, lightweight and flexible thermal barrier designed with other functional layers to impede the propagation of thermal runaway across multiple lithium-ion battery system architectures. Our thermal barrier technology is designed to offer a unique combination of thermal management, mechanical performance and fire protection properties. These properties enable EV manufacturers to achieve critical battery performance and safety goals.

In addition, we are seeking to leverage our patented carbon aerogel technology to develop industry-leading battery materials for use in lithium-ion battery cells. These battery materials have the potential to increase the energy density of the battery cells, thus enabling an increase in the driving range of EVs.

We have entered into multi-year production contracts with a number of automotive EV OEM customers to supply fabricated, multi-part thermal barriers for use in the battery systems of their EV models. These customers include General Motors, Toyota, Scania, Automotive Cells Company (or ACC, a battery cell joint venture between Stellantis N.V, Saft-TotalEnergies and Mercedes-Benz), and Audi, a luxury brand of the Volkswagen Group. We are currently supplying

thermal barrier production parts to both General Motors and Toyota, and thermal barrier prototype parts to a number of global manufacturers of EVs, grid storage and home battery systems. During 2023, we sold \$110.1 million of our PyroThin thermal barriers. During 2022, we sold \$55.6 million of our PyroThin thermal barriers. During 2021, our first full year of serving the EV and energy storage market, we sold \$6.7 million of our PyroThin thermal barriers.

The commercial potential for our PyroThin thermal barriers and our carbon aerogel battery materials in the EV market is significant. Accordingly, we are continuing to hire additional personnel, incurring additional operating expenses, incurring significant capital expenditures to expand our aerogel manufacturing capacity, establishing an automated thermal barrier fabrication operation, enhancing research and development resources, and expanding our battery materials research facilities, among other items.

Our patented aerogel products and manufacturing technologies are significant assets. Silica aerogels are complex structures in which 97% of the volume consists of air trapped between intertwined clusters of amorphous silica solids. These extremely low-density solids provide superior thermal and acoustic insulating properties. Although silica aerogels are usually fragile materials, we have developed innovative and proprietary manufacturing processes that enable us to produce industrially robust aerogel insulation cost-effectively and at commercial scale. We believe that our electrically conductive carbon aerogel materials are reaching development maturity and subsequently can expand our market opportunities in energy storage. These patented carbon aerogels are uniquely strong, providing the physical strength, charge and ion conductivity, and porosity required to host high concentrations of silicon in lithium-ion battery anodes. These silicon carbon aerogels have the potential to lower the costs and increase the energy density of EV battery systems.

Our insulation products help end-users to improve resource efficiency, reduce energy consumption, and reduce the carbon footprint of their operations. These products enable compact system design, reduce installation time and costs, promote freight and logistics cost savings, reduce system weight, minimize required storage space and enhance job site safety. Our insulation products reduce the incidence of corrosion under insulation, which is a significant maintenance cost and safety issue in energy industrial facilities. Many of our insulation products also offer strong fire protection, which is a critical performance requirement in our markets. We believe our array of product attributes provides strong competitive advantages over traditional insulation. Although competing insulation materials may have one or more comparable attributes, we believe that no single insulation material currently available offers all of the properties of our aerogel insulation products.

Our aerogel thermal barrier products are designed to enable our customers to enhance the safety and performance of their lithium-ion battery systems. These barriers are designed to impede the propagation of thermal runaway in lithium-ion battery systems at the battery cell, module and pack levels across multiple lithium-ion battery system architectures. Our ultra-thin, lightweight and flexible thermal barriers are designed to allow battery manufacturers to achieve critical safety goals without sacrificing energy density. We believe we offer the best technology available for the management of thermal runaway in the EV market.

Manufacturing Operations

We manufacture our products using our proprietary technology at our facility in East Providence, Rhode Island. We have operated the East Providence facility since 2008 and have increased our capacity in phases. To meet expected growth in demand for our aerogel products in the EV market, we remain in the process of expanding our aerogel blanket capacity by constructing a second manufacturing plant in Bulloch County, Georgia. However, in order to manage the development of the second plant so that its increased capacity comes online in a manner that aligns with our current expectations of demand from our EV customers, we have extended the timeframe for construction and commissioning of the second plant until such time as its capacity is supported by increased demand. In the meantime, and until we ramp up construction, we expect to be able to substantially reduce our planned capital expenditures for 2024. At the same time, we believe that productivity improvements in our existing Rhode Island facility combined with our supplemental supply of our energy industrial products from one or more contract manufacturers, which we refer to as external manufacturing facilities in China, will permit us to achieve a target revenue capacity of approximately \$650 million in 2024 and prior to the completion and start-up of the second plant in Georgia. Nonetheless, there can be no assurance as to when we will ramp up construction on the second plant. There can also be no assurance that our contract manufacturing strategy of meeting the demand of our energy industrial customers with supply from one or more external manufacturing facilities in China will provide us with adequate manufacturing capacity or supply for that expected demand. Furthermore, when we ramp up construction on the second plant, further cost inflation and/or supply chain disruptions, as well as potential changes in the scope of the facilities, could lead to increases to our prior estimated costs for completion of the second plant. In 2023, we opened our 59,000-square-foot engineering and rapid prototyping facility in Marlborough, MA. Our Advanced Thermal Barrier Center (ATBC) is designed to be the engineering hub of PyroThin cell-to-cell barriers, which help manufacturers optimize the safety and performance of battery packs for eMobility and energy storage system (ESS) markets.

We announced that the U.S. Department of Energy Loan Programs Office invited us into the formal due diligence and term sheet negotiation stage of the

process, which is one in several steps remaining in the due diligence process prior to the DOE making a decision on whether to issue a Conditional Commitment for a loan. This loan application is in connection with the construction of our planned second manufacturing plant in Bulloch County, Georgia. The DOE's continued evaluation of the application is not an assurance that the terms and conditions of a term sheet will be consistent with terms proposed by the applicant. The foregoing matters are wholly dependent on the results of DOE review and evaluation, and DOE's determination whether to proceed. While the Department of Energy's invitation to the formal due diligence stage is not an assurance that the Department of Energy will issue a loan, we remain deeply engaged with the Loan Programs Office and its advisors and continue to believe that we are a strong candidate to partner with the Department of Energy Loan Programs Office in this program.

Financial information about our product and research services revenues, net loss per share and our total assets are provided in our consolidated financial statements included elsewhere in this Annual Report on Form 10-K.

Financial Summary

Total revenue for the years ended December 31, 2023, 2022 and 2021 was \$238.7 million, \$180.4 million, and \$121.6 million, respectively. For the years ended December 31, 2023, 2022 and 2021, based on shipment destination, our U.S. revenue was \$151.0 million, \$114.0 million, and \$66.8 million, respectively, and our international revenue was \$87.7 million, \$66.4 million, and \$54.8 million, respectively.

Our Markets and Competition

Our principal markets are the energy industrial insulation market and the EV market. These markets are global, well-established and include large and well-capitalized end-users. The energy industrial market includes companies operating refinery, petrochemical, oil production, and liquefied natural gas (LNG) production and storage facilities. The energy industrial market also includes firms operating gas, coal, nuclear, hydro and solar thermal power generating plants and district energy systems. Insulation systems in the energy industrial market are designed to maintain hot and cold process equipment, piping and storage tanks at optimal temperatures, to protect plant and equipment from the elements and from the risk of fire, and to protect workers. This market is served by a well-organized, well-established worldwide network of distributors, contractors, and engineers.

Demand for insulation in the energy industrial market is composed of demand associated with new-build construction of facilities, capital expansions and related capital projects, as well as with routine, non-discretionary maintenance programs within existing facilities. Capital expansions and related capital projects in the energy industrial market are driven primarily by overall economic growth and projected growth in energy demand. Maintenance programs are essential to optimal operation of process equipment, to protect workers and to minimize the risk of a catastrophic loss. Accordingly, we believe that demand for insulation for maintenance purposes in comparison to capital projects is less affected by volatility associated with economic cycles, energy prices and other macroeconomic factors.

The major end-user markets that drive demand for our products include oil refining, petrochemical, natural gas and LNG production and storage, onshore oil production, offshore oil production and power generation. Global energy demand is expected to increase in the long-term and, to serve this growing demand, we believe our end-user customers will continue to invest in major energy industrial projects.

We have also developed and commercialized a proprietary line of aerogel-based thermal barriers for use in battery packs of EVs and energy storage systems. The market for our thermal barrier products encompasses batteries used in mobile platforms, including automobiles, trucks, buses and light aircraft, and fixed platforms, including home storage, grid storage and other commercial applications. The multi-billion global lithium-ion battery market continues to grow and evolve rapidly. Our thermal barrier technology offers a unique combination of thermal management, mechanical performance, and fire protection properties that enables EV manufacturers to achieve critical battery performance and safety goals. We believe that as the e-mobility and energy storage markets require increasingly powerful lithium-ion battery systems, the demand for our aerogel thermal barriers will grow rapidly as the market players seek to reduce the associated risk of thermal runaway.

We have entered into production contracts with GM to supply fabricated, multi-part thermal barriers (Barriers) for use in the battery system of its next-generation EVs, or the GM Contracts. Pursuant to the GM Contracts, we are obligated to supply Barriers at fixed annual prices and at volumes to be specified by GM up to a daily maximum quantity through the respective terms of the agreements, which expire at various times from 2026 through 2034. While GM has agreed to purchase its requirement for Barriers from us at locations to be designated from time to time by them, it has no obligation to purchase any minimum quantity of Barriers under the GM Contracts. In addition, GM may terminate the GM Contracts at any time and for any or no reason. All other terms of the GM Contracts are generally consistent with automotive original equipment manufacturer (OEMs') standard purchase terms, including quality and warranty

provisions customary in the automotive industry. We have also entered into thermal barrier production contracts with Toyota, Scania, ACC, a battery cell joint venture between Stellantis N.V, Saft-TotalEnergies and Mercedes-Benz, and Audi, a luxury brand of the Volkswagen Group.

We also sell our products for use in the sustainable insulation materials and other end markets, including for the fabrication of insulation parts by OEMs. These OEMs develop products incorporating our aerogel blankets for applications in a diverse set of markets including military aircraft, trains, buses, appliances, apparel, footwear and outdoor gear. While these are not presently our core markets, we anticipate that we may allocate a growing portion of our manufacturing capacity to serve these markets in the long term. We believe the key performance criteria for insulation in these markets and applications include thermal performance, compact design, durability and fire resistance.

We operate in a highly competitive environment. In the energy industrial insulation market, we compete with traditional insulation materials based on product performance, price, availability and proximity to the customer. Customers may choose among a variety of insulation materials that offer a range of characteristics including thermal performance, durability, vapor permeability, moisture resistance, ease of installation and upfront and lifecycle costs. Within each type of insulation material, there is also competition between the manufacturers of that material. Most types of traditional insulation materials are produced by a number of different manufacturers, and once customers have chosen the type of insulation material that they intend to use, they will choose a manufacturer of that material based primarily on each manufacturer's price and delivery schedule. Insulation manufacturers include a range of large, high-volume, multinational manufacturers offering branded products and strong technical support services to small, low-volume, local manufacturers offering low prices and limited customer support.

We believe the primary competitive factors in these markets are:

- product performance (along multiple criteria), quality and fitness for purpose;
- product price, installed cost and lifecycle cost;
- product availability; and
- proximity to customer and logistics.

Our products are priced at a premium to traditional insulation materials. While our competitors offer many traditional insulation products that are priced below our products on a per-unit basis, we believe our products have superior performance attributes and may have the lowest cost on a fully-installed basis or offer significant life-cycle cost savings.

Competition in the thermal barrier market is evolving. We believe our patented aerogel thermal barrier technology offers a unique combination of attributes to mitigate thermal runaway in lithium-ion battery systems. These attributes include industry-leading thermal performance, limited combustibility, tunable compressibility and scalable density. We expect to face increasing competition within the thermal barrier market over the next several years as new entrants seek to develop and market their own technologies and solutions.

We compete in the aerogel materials market with Armacell International S.A., JIOS Aerogel Pte. Ltd., IBIDEN Co., Ltd., Guangdong Alison Hi-Tech Co., Ltd. Nano Tech Co., Ltd., Beerenberg AS, IBIH Advanced Materials Co., Ltd., Nameite New Materials Technology Co., Ltd., Guizhou Aerospace Wujiang Electro-Mechanical Equipment Co., Ltd., Shenzhen Aerogel Technology Co., Ltd., and a growing number of other competitors that manufacture, sell or resell aerogel-based insulation products. We expect to face increasing competition in the aerogel insulation market over the next several years as existing competitors and new entrants seek to develop and market their own aerogel products. In addition to other aerogel insulation products, we also encounter competition from innovatively packaged traditional insulation materials that compete with our products based on one or more performance factors.

Within each of our target markets, we encounter one or more of these organizations or their resellers and a significant number of other aggressive national, regional and local suppliers of traditional insulation products. Our competitors are seeking to enhance traditional insulation materials and to develop and introduce new and emerging insulation technologies. Competing technologies that outperform our insulation products in one or more performance attributes could be developed and successfully introduced. See "Risk Factors —The insulation markets we serve are highly competitive. If we are unable to compete successfully, we may not be able to increase or maintain our market share and revenues."

Our market share was approximately 3% of the estimated multi-billion dollar annual global market for energy industrial insulation materials during 2022. Many of our competitors have greater market presence, larger market share, longer operating histories, stronger name recognition, larger customer bases and significantly greater financial, technical, sales and marketing, manufacturing and other resources than we have and may be better able to withstand volatility

within the industry and throughout the economy as a whole, while retaining greater operating and financial flexibility. If our competitors lower their prices, or develop new products with better performance, or if we are unable to compete effectively, our growth opportunities, share of the market, margins and profitability may decline.

Our Competitive Strengths

Because insulation is used in a wide variety of demanding applications, insulation materials must satisfy a wide range of performance criteria on a cost-effective basis. We believe that our aerogel technology has allowed us to create superior insulation products and will allow us to continue to grow our share of the energy industrial materials and thermal barrier markets. We believe that the potential for significant technological innovation in traditional materials is limited and that new high-performance materials will be required to meet evolving market requirements for energy efficient insulation and thermal barrier systems. Our line of high-performance aerogel products is positioned to meet these requirements. Our solutions are driven by our innovative and proprietary technology that produces aerogels in a flexible and industrially robust blanket form. Our solutions also benefit from over 20 years of research and development dedicated to new aerogel compositions, form factors and manufacturing technologies. We believe our aerogel blankets deliver a superior combination of performance attributes that enable energy industrial end-users to save money, improve resource efficiency, preserve operating assets and protect workers across a wide range of applications in our target markets. We believe our patented aerogel thermal barriers offer an industry-leading combination of attributes to mitigate thermal runaway in lithium-ion battery systems.

We believe the following combination of capabilities distinguishes us from our competitors and positions us to continue to gain market share in the energy industrial, sustainable insulation materials and EV markets:

- ***Disruptive Products with a Compelling Value Proposition.*** Our aerogel insulation provides two to five times the thermal performance of widely used traditional insulation in a thin, easy-to-use and durable blanket form. We believe our array of product attributes provides strong competitive advantages over traditional insulation and will enable us to gain a larger share of the energy industrial insulation market. In addition, our aerogel thermal barriers offer a combination of attributes that provide industry-leading protection against thermal runaway in lithium-ion batteries. We believe our thermal barriers provide the market-leading technological solution to combat thermal runaway and will help us gain share within the market for lithium-ion batteries used in the e-mobility and grid storage markets. Although competing materials may have one or more comparable attributes, we believe that no single insulation or thermal barrier material currently available offers all of the properties of our aerogel products.
- ***Important End Markets.*** Our aerogel insulation products are primarily used in large-scale energy industrial facilities. Our aerogel thermal barrier products are gaining share in the rapidly growing, high value EV market. Given the projected high growth in the e-mobility markets and continued growth in global energy consumption in the long-term, and the construction of new facilities to satisfy this demand, we believe that we serve well-capitalized and rapidly growing global end markets. In order to capture the opportunities in our end markets, we have a network of sales professionals and qualified distributors in more than 50 countries around the world.

- **Strong Installed Base with Industry-leading Energy Customers.** We have an installed base of more than 475 million square feet of insulation, representing more than \$1.4 billion in cumulative product sales since 2008. Through our relationships with industry-leading energy industrial customers, our products have undergone rigorous testing and technical validation and are now in use at most of the world's largest oil producers, refiners and petrochemical companies. These relationships have shortened the sales cycle with other customers and have helped to facilitate our market penetration. We also have strong relationships with a global network of energy-focused distributors, contractors and engineering firms that understand the significant advantages our products provide to end-users.
- **Thermal Barrier Adoption by Leading EV Customers.** In 2020 and 2021, we entered into contracts with GM to supply fabricated, multi-part thermal barriers for use in the battery system of its next-generation EVs. This relationship has helped to validate our thermal barrier technology with other companies providing products and solutions to the EV, lithium-ion battery and grid storage markets. We are currently supplying thermal barrier production parts to both GM and Toyota. We are also supplying thermal barrier prototype parts to a number of other U.S., European and Asian manufacturers of EVs, grid storage and home battery systems. We have also entered into thermal barrier production contracts with Toyota, Scania, ACC, a battery cell joint venture between Stellantis N.V, Saft-TotalEnergies and Mercedes-Benz, and Audi, a luxury brand of the Volkswagen Group. During 2023, we sold \$110.1 million of our PyroThin thermal barriers. During 2022, we sold \$55.6 million of our PyroThin thermal barriers. During 2021, our first full year of serving the EV and energy storage market, we sold \$6.7 million of our PyroThin thermal barriers. We are engaged in system development and quoting activities with a wide range of additional prospective customers in the broader e-mobility and energy storage markets.
- **Proven, Scalable Business Model.** Our proprietary manufacturing technology is proven and has been successfully scaled to meet increasing demand. We have operated the East Providence, RI facility since 2008 and have increased our annual revenue capacity in phases. To meet expected growth in demand for our aerogel products in the EV market, we remain in the process of expanding our aerogel blanket capacity by constructing a second manufacturing plant in Bulloch County, Georgia. However, in order to manage the development of the second plant so that its increased capacity comes online in a manner that aligns with our current expectations of demand from our EV customers, we have extended the timeframe for construction and commissioning of the second plant until such time as its capacity is supported by increased demand. At the same time, we believe that productivity improvements in our existing Rhode Island facility combined with our supplemental supply of our energy industrial products from one or more external manufacturing facilities in China will permit us to achieve a target revenue capacity of approximately \$650 million in 2024 and prior to the completion and start-up of the second plant in Georgia.
- **Protected Technology Platform and Proprietary Manufacturing Capability.** Our Aerogel Technology Platform[®] is the result of extensive research and development dedicated to new aerogel compositions, form factors and manufacturing technologies. Our intellectual property portfolio is supported by 433 issued patents, with an additional 383 pending, in U.S. and foreign jurisdictions in areas related to product design, chemistry, process technology and market applications. In addition, we have significant knowledge and trade secrets related to product formulations and manufacturing techniques. We believe our portfolio of patents, trade secrets, and knowledge present a barrier to potential new entrants in the commercialization of aerogel products.
- **Experienced Management Team with a Demonstrated Track Record.** Our executive officers have an average of more than 20 years of experience in global industrial companies, specialty chemical companies, automotive, or related material science research. This management team is responsible for the continued development of our Aerogel Technology Platform, the commercial acceptance of our products, and the creation of a global distribution and marketing platform. As of December 31, 2023, we employed 548 people, including material scientists, engineers, manufacturing line operators, sales personnel, administrative staff, and management. Additionally, we engaged Prodensa Servicios de Consultora to establish OPE Manufacturer Mexico S de RL de CV, a maquiladora located in Mexico, which manufactures thermal barrier PyroThin products and operates an automated fabrication facility for PyroThin. We believe our dedicated and experienced team is an important competitive asset.

Our Growth Strategy

Our strategy is to create economic value by leveraging our technological and market leadership in aerogels to be the premier provider of high-performance aerogel products serving the global EV and energy industrial markets. We also will pursue high-value opportunities for our aerogel insulation products within the sustainable insulation materials market and a diverse set of new markets. In addition, we will leverage our Aerogel Technology Platform to develop innovative, aerogel-enhanced products for applications outside of the global insulation market.

Key elements of our strategy include:

- **Leverage Aerogel Technology Platform in the EV Market.** We plan to build upon the commercial success of our industry-leading PyroThin thermal barriers within the battery systems of EVs. We will continue to hire experienced automotive business development personnel, hire dedicated thermal barrier fabrication employees, and increase our aerogel blanket manufacturing capacity to keep pace with the significant potential demand for our PyroThin thermal barriers. In addition, we will seek to leverage the unique properties of our proprietary and patented carbon aerogels to improve the performance and cost of lithium-ion batteries. We will continue our efforts with our partners to explore the potential use of our silicon-rich carbon aerogel materials in the anode and cathode of lithium-ion batteries and in solid-state batteries. We will continue to seek to engage with additional leading battery material and EV manufacturers to realize the full potential of our silica aerogels, our carbon aerogels and our broader Aerogel Technology Platform within the EV market.
- **Strategically Increase Capacity to Meet Demand.** Demand for our aerogel products has grown significantly since our inception. From 2008 through 2023, our energy industrial revenue has grown at a compound annual growth rate of 14% to \$128.6 million. Furthermore, demand for our thermal barrier aerogel products has significantly grown, generating \$110.1 million of revenue in 2023 compared to \$55.6 million of revenue in 2022 and \$6.7 million of revenue in 2021. To meet expected growth in demand for our aerogel products in the EV market, we have been in the process of expanding our aerogel blanket capacity by constructing a second manufacturing plant in Bulloch County, Georgia. However, in order to manage the development of the second plant so that its increased capacity comes online in a manner that aligns with our current expectations of the demand from our EV customers, we are extending the timeframe for construction and commissioning of the second plant until such time as its capacity is supported by increased demand. In the meantime, and until we ramp up construction, we expect to be able to substantially reduce our planned capital expenditures for 2024. At the same time, we believe that productivity improvements in our existing Rhode Island facility combined with our supplemental supply of our energy industrial products from one or more external manufacturing facilities in China will permit us to achieve a target revenue capacity of approximately \$650 million in 2024 and prior to the completion and start-up of the second plant. Nonetheless, there can be no assurance as to when we will ramp up construction on the second plant. There can also be no assurance that our contract manufacturing strategy of meeting the demand of our energy industrial customers with supply from one or more external manufacturing facilities in China will provide us with adequate manufacturing capacity or supply for that expected demand. Furthermore, when we ramp up construction on the second plant, further cost inflation and/or supply chain disruptions, as well as potential changes in the scope of the facilities, could lead to increases to our prior estimated costs for completion of the second plant.
- **Capitalize on Innovation to Develop New Markets.** Our team of materials scientists and engineers focus on advancing our Aerogel Technology Platform and developing next generation aerogel compositions, form factors and manufacturing processes. We believe that we are well-positioned to leverage over 20 years of research and development to develop and commercialize disruptive aerogel products for a wide array of new markets beyond the energy industrial, sustainable insulation materials and EV markets. We will seek to exploit the unique characteristics of aerogels, including low thermal conductivity, high surface area, and tunable electrical conductivity and porosity to develop aerogel-enhanced products and next generation technology addressing complex and unmet market needs. We will continue to seek potential partnerships with industry leaders that include a mix of commercial, technical and financial elements to realize the full potential offered by our proprietary Aerogel Technology Platform in targeted markets.
- **Broaden Energy Market Diversity and Grow Market Share.** We plan to add resources to continue to grow our share of the energy industrial insulation market, both through increased sales to our existing customers and through sales to new customers. We plan to continue to expand and enhance our global sales and distribution network and seek to promote greater enterprise-wide adoption of our products by existing end-user customers. To date, the majority of our energy industrial insulation market revenue has been generated from applications in refineries and petrochemical facilities. We will continue to pursue and expect greater adoption of our products for applications in the LNG and power markets. In addition, our product revenue will continue to be generated, in large part, by demand for insulation associated with scheduled plant shutdowns, or turnarounds, and other maintenance-related projects. With broad adoption of our products and our growing installed base, we expect that our products will be specified at increasing rates during the design phase in a growing number of new-build and capital expansion projects. We also expect that growth in global energy demand over time will result in increased new-build and large capacity expansion projects, thereby driving additional demand for our aerogel products.
- **Enhance Our Profit Margins, Operational Cash Flow and Return on Invested Capital.** We will seek to improve the efficiency of our manufacturing process, to optimize the formulation of our products and to manage our supply chain to reduce costs. We believe additional opportunities to realize production efficiencies and to reduce per unit overhead costs will arise with growth in the scale of our manufacturing operations. We believe our current expansion plans and available manufacturing technology advancements will enhance profit potential, increase

operating cash flow capability, and offer attractive returns on incremental invested capital. In addition, we will focus our development efforts on new products and next generation technology with application in new, high value market segments.

Our Aerogel Products

Silica aerogels are highly porous structures in which 97% of the volume consists of air trapped between intertwined clusters of amorphous silica solids. Silica aerogels are low-density, extremely fragile materials. However, our proprietary manufacturing process produces silica aerogels in a flexible, resilient, durable and easy-to-use blanket form.

The core raw material in the production of our aerogel insulation products are alkyl silicate and silane precursors. Our manufacturing process initially creates a semi-solid alcogel in which the silica structure is filled with ethanol. We produce aerogel by means of a supercritical extraction process that removes ethanol from the gel and replaces it with air. Our process allows the ethanol to be extracted without causing the solid matrix in the gel to collapse from capillary forces.

Our material costs were 36%, 51%, and 48% of product revenue for the years ended December 31, 2023, 2022 and 2021, respectively. We seek to lower our manufacturing costs, while maintaining appropriate performance characteristics, and to improve the per square foot costs of our silica aerogel blankets by optimizing our formulations to reduce material costs, by enhancing manufacturing process controls to improve yields, by realizing price reductions from existing vendors, by qualifying new vendors and by reducing shipping costs. Our objective is both to reduce costs to enhance our competitive position and to ensure we deliver high quality products to our customers.

The materials used in the production of our silica aerogel products consist primarily of several silica precursors, fiber batting, and other additives. The markets for these materials are generally competitive and multiple sources of supply exist for all of our raw materials. However, from time-to-time, we have experienced a significant increase in the price of certain silica precursors due to supply imbalances in the silanes market. We are actively working to reformulate our products to reduce our reliance on the materials that are susceptible to significant price fluctuations. We are also working to expand the geographic diversity of our supply base to reduce the risk of demand and supply imbalances in any one country or region.

We purchase silica precursors from several suppliers in the United States, Europe and Asia, including China. Based on the current level of demand for our products, we believe that an adequate long-term supply of silica precursors is available. However, if demand for our products increases rapidly, we will need to work with suppliers to ensure that an adequate long-term supply of silica precursors will be available at competitive prices. Suppliers of silica precursors include industrial companies that produce the materials directly or that produce them as a byproduct of other industrial processes. We are working with a number of these suppliers to plan for our potential future needs and to develop our processes to reduce the long-term cost impact of these materials. We are also considering investing in the technology and the capital assets required to produce certain critical silica precursors in our planned aerogel manufacturing facility in Bulloch County, Georgia. See “Risk Factors — Shortages of the raw materials used in the production of our products, increases in the cost of such materials or disruptions in our supply chain could adversely impact our financial condition and results of operations.”

Our aerogel blankets are reinforced with fiber batting. We manufacture and sell our blankets primarily in 60-inch-wide, three-foot diameter rolls with a standard range of thickness of one millimeter to ten millimeters. Our base products are all flexible, hydrophobic, vapor permeable, compression resistant and able to be cut and fabricated using conventional tools. We have specifically developed our line of aerogel blankets to meet the requirements of a broad set of applications within our target markets. The composition and attributes of our standard aerogel blankets are described below:

EV & Energy Storage Market

- ***PyroThin.*** PyroThin thermal barriers are our new generation of ultra-thin flexible aerogel products engineered to satisfy the needs of the EV and energy storage industries to address thermal runaway issues in lithium-ion batteries. PyroThin thermal barriers can be used to provide passive fire protection at the cell, module or pack level within multiple lithium-ion battery system architectures. PyroThin thermal barriers can also be customized to offer a unique combination of thermal management, mechanical performance and fire protection properties that enable an EV manufacturer to achieve targeted battery performance and safety goals.

Energy Industrial Markets

- ***Pyrogel XTE.*** Pyrogel XTE, our best-selling product, is reinforced with a glass-fiber batting and has an upper use temperature of 650° C. Pyrogel XTE was initially designed for use in refineries and petrochemical facilities, but has proven to have wide applicability throughout the energy

industrial market. Pyrogel XTE is optimized for high temperature applications between 100° C and 400° C. Pyrogel XTE's hydrophobicity and vapor permeability reduce the risk of corrosion under insulation in energy industrial operating systems when compared to traditional insulation.

- **Pyrogel HPS.** Pyrogel HPS is optimized for applications within the power generation market with operating temperatures greater than 400° C. With an upper use temperature of 650° C, high durability and extremely low thermal conductivity, Pyrogel HPS is ideal for installation in high performance turbine systems and in demanding thermal environments in power plants and systems. Pyrogel HPS also provides strong value at high temperatures and in demanding thermal applications in refining and chemical processing systems.
- **Pyrogel XTF.** Pyrogel XTF provides thermal performance similar to Pyrogel XTE, but is reinforced with a glass- and silica-fiber batting. Pyrogel XTF is specially formulated to provide strong protection against fire.
- **Cryogel Z.** Cryogel Z is designed for sub-ambient and cryogenic applications in the energy industrial market. Cryogel Z is reinforced with a glass and polyester-fiber batting and is produced with an integral vapor barrier. Cryogel Z is also specially formulated to minimize the incidence of stress corrosion cracking in stainless steel systems. Cryogel Z's combination of properties allows for simplified system designs and reduced installation costs in cold applications throughout the energy industrial market when compared to traditional insulation.
- **Spaceloft Subsea.** Spaceloft Subsea is reinforced with glass- and polyester-fiber batting and is designed for use in pipe-in-pipe applications in offshore oil production. Spaceloft Subsea is typically fabricated and pre-packaged to permit faster installation. Spaceloft Subsea allows for small profile carrier pipelines and associated reductions in capital costs.

Other Markets

- **Cryogel X201.** Cryogel X201 is similar in composition to Cryogel Z, but is produced without the integral vapor barrier. Cryogel X201 is designed for use in cold system designs where space is at a premium. Cryogel X201 is targeted to OEMs that design, produce and sell refrigerated appliances, cold storage equipment and aerospace systems.
- In 2024, consistent with our current expectations and plans for the growth of our business, we discontinued production of our Spaceloft® sustainable insulation materials, including Spaceloft Grey and Spaceloft A2.

R-Values by Material

Insulation is a material or combination of materials that slows the transfer of heat from one side of the material to the other. The composition of our aerogel products minimizes the three mechanisms of thermal transport:

- **Conduction.** Heat conduction through a material is correlated to the material's density. Aerogels are very low-density solids. As a result, thermal conductivity through the aerogel material itself is extremely low.
- **Convection.** Heat convection in gases is through movement of gas molecules. Due to the restricted movement of gases in the nanoporous aerogel structure, thermal convection is eliminated inside the aerogels.
- **Radiation.** Radiation requires no medium to transfer the heat. Thermal radiation is partially absorbed by aerogels. Our aerogel products also contain infrared absorbing additives to reduce radiant heat transfer significantly.

We believe our aerogel products offer the lowest levels of thermal conductivity, or best insulating performance, of any widely used insulation or thermal barrier available on the market today.

The lower a material's thermal conductivity, the more slowly heat is transferred through the material. R-values are a commonly used measure of an insulating material's resistance to heat transfer. R-value is calculated as the thickness of an insulation material divided by the thermal conductivity of the insulation material. Materials with higher R-values have lower thermal conductivity and are better insulators. Traditional and specialty insulation materials provide a range of R-values. Aerogels have the highest R-value per unit of thickness in comparison to traditional insulation materials.

Qualification for Use

Our products have undergone rigorous testing and are qualified for global usage in both routine maintenance and in capital projects at many of the world's largest oil producers, refiners, and petrochemical companies, and within the next-generation lithium-ion battery systems of five of the largest global automotive manufacturers. These end-users of our products have well-defined practices, codes, specifications and standards for materials and systems installed in their vehicles or used in their facilities. These specifications include system design standards, material qualification and selection processes, insulation application practices, and quality control requirements. As part of the material qualification process established by these companies, a new insulation or thermal

barrier product must meet general industry standards, such as consensus standards developed by ASTM International, and, in many cases, company-specific internal standards to be considered and approved for use or designed into vehicle platforms. In addition, most of these companies require one or more field trials of tests to evaluate fitness for use in specific applications. These companies either run these qualification processes and field trials internally or through third parties engaged by them, and they generally do not publicly disclose the results of their testing. While the specific processes and timelines vary from company to company, in general, upon successful completion of the qualification process for an insulation or thermal barrier product, an end-user will typically deem the product to be qualified for use in its facilities on a local, regional, or global basis for one or more applications or vehicles. Because our end-user customers are typically businesses with very large operations in multiple sites, our insulation or thermal barrier sales likely represent only a small portion of the total product used by any one of these companies. Accordingly, once our products are qualified or designed into a platform at a specified company, we continue to seek to expand the use of our products by the end-use customer in additional applications, platforms, locations, or vehicles.

Our Sales Channel

We market and sell our products primarily through our global sales force. Our sales personnel are based in North America, Europe, and Asia and travel extensively to market and sell our products to new and existing customers. The efforts of our sales force are supported by a small number of sales consultants with extensive knowledge of a particular market or region. Our sales force establishes and maintains customer and partner relationships, delivers highly technical information and provides first-class customer service. We plan to expand our sales force and business development resources globally to support anticipated growth in customers and demand for our products.

Our sales force calls on and maintains relationships with participants at all levels of the energy industrial supply chain. We have established a network of insulation distributors to ensure rapid delivery of our products in critical regions. Our sales personnel work to educate insulation contractors about the technical and operating cost advantages of aerogel blankets. Our sales force also works directly with end-users and engineering firms to promote qualification, specification, and wider acceptance of our products in existing and new applications. In the energy industrial market, we rely heavily on the existing and well-established channel of distributors and contractors to deliver products to our customers. In addition, our sales and business development personnel work directly with OEMs and strategic partners, including within the EV industry, to create new product designs and solutions to expand our market reach.

The sales cycle for a new insulation material or thermal barrier is typically lengthy. Our sales cycle from initial customer contact to widespread use can take from one to three years, although we typically realize increasing revenue at each stage in the cycle. We believe our relationships with technically sophisticated customers and strategic partners serve to validate our technology, products and value proposition within a target market. These relationships have proven to accelerate the sales cycle with other customers within specific markets and to facilitate growth in market share. We have focused our marketing efforts on developing technical support materials, installation guides, case studies and general awareness of the superior performance of our aerogel blankets and thermal barriers. We rely principally on our website, social media, printed technical materials, participation in industry conferences and tradeshow and presentation of technical papers to communicate our message to existing and potential customers. We also receive strong word-of-mouth support from the growing network of distributors, installation contractors, OEMs, strategic partners and end-users that understand the benefits of our products.

Our Customers and End-Users

Customers

Energy Industrial

Our primary customers in the energy industrial market are distributors, installation contractors and fabricators that stock, install and customize insulation products, components and systems for technically sophisticated end-users that require high-performance insulation.

- ***Distributors:*** We currently operate through a global network of insulation distributors. In general, insulation distributors stock, sell and distribute aerogel materials to insulation contractors and end-users. The distribution of our product outside of the United States is at times conducted under agreements that provide for exclusivity by geography linked to annual purchase volume minimums. These insulation distributors typically market, promote and advertise our aerogel materials across their market.
- ***Contractors:*** We currently sell directly to a number of insulation contractors under project specific contracts or general purchase orders. Insulation contractors generally perform insulation installation, inspection, maintenance and project management for end-users. In addition, some insulation contractors provide end-users with project engineering and design services.

- **Fabricators:** We currently sell directly to a small network of fabricators that design, customize and manufacture insulation components and systems for use in the energy industrial, sustainable insulation materials, transportation, appliance and apparel markets.
- **Direct Sales to End-Users:** In certain instances, we sell directly to end-users in the energy industrial insulation market. In these instances, our end-users directly manage and control specification, logistic, installation, inspection, maintenance and fabrication activities of our aerogel products.

EV and Energy Storage

Our customers in the evolving EV and energy storage markets include EV manufacturers, Tier 1 automotive suppliers, lithium-ion battery manufacturers, and e-mobility and energy storage companies. Our existing and prospective customers range from start-ups to the largest automotive manufacturers in the world.

We typically supply thermal barrier products to our automotive OEM customers through purchase orders, which are generally governed by general terms and conditions established by the OEM. The terms and conditions typically contemplate a relationship under which our customers place orders for their requirements of specific components supplied for particular vehicles but are not required to purchase any minimum quantity of products from us. We expect that these relationships will typically extend over the life of the related vehicle. Prices are negotiated with respect to each business award, which may be subject to adjustments under certain circumstances, such as commodity or foreign exchange escalation/de-escalation clauses or for cost reductions achieved by us. The terms and conditions typically provide that we are subject to a warranty on the products supplied; in most cases, the duration of such warranty is coterminous with the warranty offered by the OEM to the end-user of the vehicle. We may also be obligated to share in all or a part of recall costs if the OEM recalls its vehicles for defects attributable to our products.

Individual purchase orders from our automotive OEM customers are terminable for cause or non-performance and, in most cases, upon our insolvency and certain change of control events. In addition, our automotive OEM customers often have the option to terminate for convenience on certain programs, which permits our customers to impose pressure on pricing during the life of the vehicle program, and issue purchase contracts for less than the duration of the vehicle program, which potentially reduces our profit margins and increases the risk of our losing future sales under those purchase contracts.

Although customer programs typically extend to future periods, and although there is an expectation that we will supply certain levels of automotive OEM production during such future periods, customer agreements including applicable terms and conditions do not constitute firm orders. Firm orders are generally limited to specific and authorized customer purchase order releases. Firm orders are typically fulfilled as promptly as possible from the conversion of available raw materials, sub-components and work-in-process inventory for OEM orders. The dollar amount of such purchase order releases on hand and not processed at any point in time is not believed to be significant based upon the time frame involved.

Additional Customer Information

General Motors LLC and Distribution International, Inc. represented 41% and 14%, respectively, of our total revenue in 2023 and were our only customers representing 10% or more of our revenue for that period. In 2022, GM and Distribution International, Inc. represented 25% and 22%, respectively, of our total revenue and were our only customers representing 10% or more of our revenue for that period. Distribution International, Inc. represented 28% of our total revenue in 2021 and was our only customer representing 10% or more of our revenue for that period.

Our product revenue is generated by sales to customers around the world. In 2023, 63% of our product revenue was generated in the United States, 18% in Europe, 15% in Asia, 3% in Latin America, and 1% in Canada, based on shipment destination.

A substantial portion of our sales are to shipment destinations located outside of the United States, including France, Norway, Thailand, Canada, Germany, Taiwan, Great Britain, Colombia, and South Korea. Total revenue generated from outside of the United States amounted to \$87.7 million or 37% of total revenue, \$66.4 million or 37% of total revenue and \$54.8 million or 45% of total revenue, in the years ended December 31, 2023, 2022 and 2021, respectively. In addition, we may continue to expand our operations outside of the United States. As a result, we are subject to a number of risks. See “Risk Factors — A substantial portion of our revenue comes from sales in foreign countries, and we may expand our operations outside of the United States, which subjects us to increased economic, foreign exchange, operational, and political risks that could increase our costs and make it difficult for us to operate profitably.”

End-Users

The end-users of our aerogel blankets and thermal barriers include some of the largest and most well-capitalized companies in the world. Our products are installed in more than 50 countries worldwide.

Energy Industrial

- ***Oil Refining:*** We believe our products have been installed in more than 30% of the world's 640 refineries. In addition, we believe our aerogel blankets are used by 24 of the world's 25 largest refining companies including ExxonMobil, Shell and Chevron, among others. Over time, these companies have used our products in an increasing range of applications and throughout an increasing number of their facilities.
- ***Petrochemical:*** We believe our aerogel blankets are used by all of the world's 20 largest petrochemical companies including Reliance Industries, Formosa Petrochemical, and LyondellBasell Industries, among others.
- ***Natural Gas and LNG:*** Our products are in use at facilities operated by PTT LNG, ExxonMobil, and Dominion Energy, among others.
- ***Onshore:*** Our aerogel blankets are in use in several Canadian oil sands facilities owned and operated by Suncor Energy, ConocoPhillips and Husky Energy, among others.
- ***Offshore:*** Our products are currently used in subsea projects off the coast of Brazil, in the Gulf of Mexico, in the North Sea, off the coast of Malaysia and off the west coast of Africa. Our products are installed in offshore projects owned by Total, Marathon Oil, ConocoPhillips, and Shell, among others.
- ***Power Generation:*** We are targeting operators of gas, coal, nuclear, hydro and solar power generating facilities. Our products are currently used at facilities owned and operated by NextEra Energy Resources, Southern Company, and Duke Energy, among others.
- ***District Energy:*** Our products are used in medium- to high-temperature steam distribution networks in universities and municipalities within the United States and Asia.

EV Market

Our thermal barrier products are in use today in EV battery systems of GM and Toyota with a leading global platform. We believe our customer base will expand in the near term to include additional EV manufacturers, Tier 1 automotive suppliers, lithium-ion battery manufacturers, and e-mobility and energy storage companies.

Our carbon aerogel program seeks to increase the performance of lithium-ion battery cells to enable EV manufacturers to extend the driving range and reduce the cost of EVs, among other uses. We are targeting the manufacturers of battery components, batteries, grid battery systems, and EVs as potential customers for our carbon aerogel materials.

Sustainable Insulation Materials and Other Markets

Traditionally, we have relied on the efforts of a small network of partners, OEMs and fabrication houses to serve the sustainable insulation materials, transportation, apparel and appliance markets. These partners, OEMs and fabricators are manufacturers of components and systems for refrigerated and hot appliances, cold storage equipment, automobiles, aircraft, trains, electronics, and outdoor gear and apparel. The end-users of our products in these markets include a wide range of institutions, businesses, individuals, municipalities and government agencies.

Manufacturing

We manufacture our products using our proprietary technology at our facility located in East Providence, Rhode Island. We have operated the East Providence facility since 2008 and have significantly increased manufacturing capacity and productivity during the period. Our manufacturing process is proven and has been scaled to meet increasing demand.

Our manufacturing group is led by a seasoned team with management experience at global industrial and specialty chemical companies. Our manufacturing workforce is skilled, and we have experienced employee turnover consistent with our industry. We have well-defined operating processes and maintenance, environmental, health and safety programs to support our operations. We employ statistical processes and quality controls in our manufacturing systems. We routinely measure and monitor thermal conductivity, hydrophobicity and other key properties of the aerogel blankets produced in our manufacturing operations. We are ISO 9001:2015 certified.

We have operated the East Providence, RI facility since 2008 and have increased our capacity in phases since that time. To meet expected growth in demand for our aerogel products in the EV market, we remain in the process of expanding our aerogel blanket capacity by constructing a second manufacturing plant in Bulloch County, Georgia. However, in order to manage the development of the second plant so that its increased capacity comes online in a manner that aligns with our current expectations of demand from our EV customers, we have extended the timeframe for construction and commissioning of the second plant until such time as its capacity is supported by increased demand. In the meantime, and until we ramp up construction, we expect to be able to substantially reduce our planned capital expenditures for 2024. At the same time, we believe that productivity improvements in our existing Rhode Island facility combined with our supplemental supply of our energy industrial products from one or more external manufacturing facilities in China will permit us to achieve a target revenue capacity of approximately \$650 million in 2024 and prior to the completion and start-up of the second plant in Georgia. Nonetheless, there can be no assurance as to when we will ramp up construction on the second plant. There can also be no assurance that our contract manufacturing strategy of meeting the demand of our energy industrial customers with supply from one or more external manufacturing facilities in China will provide us with adequate manufacturing capacity or supply for that expected demand. Furthermore, when we ramp up construction on the second plant, further cost inflation and/or supply chain disruptions, as well as potential changes in the scope of the facilities, could lead to increases to our prior estimated costs for completion of the second plant. In 2023, we opened our 59,000-square-foot engineering and rapid prototyping facility in Marlborough, MA. Our Advanced Thermal Barrier Center (ATBC) is designed to be the engineering hub of PyroThin cell-to-cell barriers, which help manufacturers optimize the safety and performance of battery packs for eMobility and energy storage system (ESS) markets.

We closely monitor all stages in the manufacture of our aerogel blankets. Our direct ownership of manufacturing operations in East Providence, RI allows us to maintain control of proprietary process technologies and to control product quality. We also closely monitor the manufacturing process and quality control of the aerogels supplied by our external manufacturing facilities in China. As of December 31, 2023, we have contracted with a contract manufacturer in China to produce supplemental supply of our Pyrogel XTE and Cryogel Z products. Our production of aerogel blankets at our East Providence, RI facility utilizes a continuous process and consists of the following key steps:

- ***Sol Preparation.*** Mixing of silica precursors in ethanol, a catalyst and additives in set formulas to deliver the target properties of the resultant aerogel.
- ***Casting.*** Combination of the sol and fiber batting and initial formation of the gel structure.
- ***Aging.*** Bathing of the gel blankets in fluids to impart desired physical and thermal properties.
- ***Extraction.*** Supercritical extraction of the ethanol liquid from the gel blanket to produce a dried aerogel blanket.
- ***Heat Treatment.*** Drying to remove trace ethanol, salts and water from the aerogel blankets.
- ***Finishing.*** Coating to enhance quality and product handling.
- ***Fabrication.*** Cutting, lamination, and production of components and multi-layer systems for custom applications in the EV and subsea markets.
- ***Quality Control.*** Utilizing statistical process and quality controls to measure thermal conductivity, hydrophobicity and other key properties of our aerogel products.

Our material costs were 36%, 51%, and 48% of product revenue for the years ended December 31, 2023, 2022 and 2021, respectively.

The materials used in the production of our products consist primarily of several silica precursors, fiber batting, and other additives. The markets for these materials are generally competitive and multiple sources of supply exist for all of our raw materials. However, from time-to-time, we have experienced a significant increase in the price of certain silica precursors due to a supply imbalance in the silanes market. We are actively working to reformulate our products to reduce our reliance on materials that are susceptible to significant price fluctuations. We are also working to expand the geographic diversity of our supply base to reduce the risk of demand and supply imbalances in any one country or region.

We purchase silica precursors from several suppliers in the United States, Europe and Asia, including China. Based on the current level of demand for our products, we believe that an adequate long-term supply of silica precursors is available. However, if demand for our products increases rapidly, we will need to work with suppliers to ensure that the long-term supply of silica precursors will be available at competitive prices. Suppliers of silica precursors include industrial companies that produce the materials directly or that produce them as a byproduct of other industrial processes. We are working with a number of suppliers to plan for our potential future needs and to develop our processes to reduce the long-term cost impact of these materials. We are also considering investing in the technology and the capital assets required to produce certain critical silica precursors in our planned aerogel manufacturing facility in Bulloch

County, Georgia. See “Risk Factors — Risks Related to Our Business and Strategy — Shortages of the raw materials used in the production of our products, increases in the cost of such materials or disruptions in our supply chain could adversely impact our financial condition and results of operations.”

We seek to lower our manufacturing costs, while maintaining appropriate performance characteristics, and to improve the per square foot costs of our aerogel blankets by optimizing our formulations to reduce material costs, by enhancing manufacturing process controls to improve yields, by realizing price reductions from existing vendors, by qualifying new vendors and by reducing shipping costs. In addition, we believe additional opportunities to realize production efficiencies and to reduce per unit overhead costs will arise with growth in the scale of our manufacturing operations. Our objective is both to reduce costs to enhance our competitive advantage and to ensure we deliver high quality finished products to our customers.

Research and Development

The mission of our research and development team is to leverage our Aerogel Technology Platform in support of our commercial objectives. In our existing markets, research and development personnel design new and improved insulation and thermal barrier products to enhance our value to customers and to expand our revenue potential. Our materials scientists and engineers also seek to develop enhanced chemical and process technologies to improve yields, lower manufacturing costs and improve product performance. In new markets, research and development personnel seek to exploit the unique characteristics of aerogels, including low thermal conductivity, high surface area, and tunable electrical conductivity and porosity, to develop aerogel-enhanced products and next generation technology addressing complex and unmet market needs.

Our research and development expenditures were \$16.4 million, \$16.9 million, and \$11.4 million for the years ended December 31, 2023, 2022 and 2021, respectively.

Intellectual Property

Our success depends in part upon our ability to obtain, maintain and enforce intellectual property rights that cover our Aerogel Technology Platform, including, product forms, applications and/or manufacturing technologies and the technology or know-how that enables these product forms, applications, technologies and specifications, to avoid and defend against claims that we infringe the intellectual property rights of others, and to prevent the unauthorized use of our intellectual property. Since aerogels were developed more than 80 years ago, there has been a wide range of research, development and publications on aerogels and related technologies, which make it difficult to establish intellectual property rights to many key elements of aerogel technology and to obtain meaningful patent protection. Where appropriate, we seek to protect our rights by filing patent applications in the U.S. and other key foreign jurisdictions related to products, processes, technology and improvements that we consider patentable and important to our business and, in particular, our aerogel technology, product forms and their applications in promising markets and our manufacturing technologies. We also rely on trade secrets, trademarks, licensing agreements, confidentiality and nondisclosure agreements and continuing technological innovation to safeguard our intellectual property rights and develop and maintain our competitive edge.

As of December 31, 2023, we owned 75 issued U.S. patents, 51 pending U.S. patent applications, 358 issued foreign patents and 332 pending foreign patent applications. The scope of each of our patents varies in accordance with local law.

We have successfully enforced our patent rights against Chinese aerogel manufacturers in the U.S. at the International Trade Commission and in Europe at the District Court in Mannheim, Germany. We also have an ongoing patent infringement action against Beerenberg Services AS and Beerenberg Korea Ltd. at the Seoul District Court and against Beerenberg Korea Ltd., and Bronx (China) Co., Ltd. at the Korea Trade Commission (KTC) in connection with the alleged infringement of the Korean counterparts of our patents previously asserted successfully in Germany and also an additional Korean patent family covering high performance aerogel compositions. We have an ongoing patent infringement action against AMA S.p.A. and AMA Composites S.r.l. (collectively, AMA) at the Court of Genoa, Italy in connection with alleged infringement of the Italian part of our patents previously asserted successfully in Germany. Further details of these actions are set forth in our prior Annual Reports on Form 10-K and in other filings. In addition to the foregoing, we have been and may be from time-to-time party to other legal proceedings that arise in the ordinary course of business and to other patent enforcement actions to assert our patent rights.

Due to their nature, it is difficult to predict the outcome or the costs involved in any litigation. Furthermore, our adversaries may have significant resources and interest to litigate and therefore, these litigation matters could be protracted and may ultimately involve significant legal expenses.

We believe that having distinctive names is an important factor in marketing our products, and therefore we use trademarks to brand some of our products, including Pyrogel, PyroThin and Cryogel. As of December 31, 2023, we had eight trademark registrations in the United States, and 81 trademark registrations in foreign jurisdictions, including the European Union, United Kingdom, Japan, China, Canada, Mexico, India, South Korea and Brazil.

Additionally, we had two pending US trademark applications and four pending foreign trademark applications. Although we have a foreign trademark registration program for selected marks, our approach may not be comprehensive, and we may not be able to register or use such marks in each foreign country in which we seek registration.

Cross License Agreement with Cabot Corporation

We have a cross license agreement with Cabot Corporation under which each party grants to the other party certain intellectual property rights. The cross license agreement remains in effect until the expiration of the last to expire of the issued patents or patent applications and acquired patents licensed thereunder. Further details of this cross license are set forth in our prior Annual Reports on Form 10-K and in other filings.

Our Company

We are a corporation organized under the laws of Delaware. We own three wholly owned subsidiaries: Aspen Aerogels Rhode Island, LLC, Aspen Aerogels Germany, GmbH and Aspen Aerogels Georgia, LLC. We maintain our corporate offices in Northborough, Massachusetts.

We are required to file annual, quarterly and current reports, proxy statements and other information required by the Securities Exchange Act of 1934, as amended, or the Exchange Act, with the Securities and Exchange Commission, or the SEC. SEC filings are available at the SEC's website at <https://www.sec.gov>.

We maintain a public website at <https://www.aerogel.com> and use our website as a means of disclosing material non-public information and for complying with our disclosure obligations under Regulation FD. Our website includes an Investors section through which we make available, free of charge, our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, Proxy Statements and Forms 3, 4 and 5 filed on behalf of directors and executive officers, as well as any amendments to those reports filed or furnished pursuant to the Exchange Act as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC. The members of our Board of Directors and the designated chairs of the committees of the Board of Directors are reflected on the signature page of this annual report on Form 10-K. We also make available on our website the charters for our Board of Directors' Audit Committee, Compensation and Leadership Development Committee and Nominating, Governance and Sustainability Committee, as well as our Code of Business Conduct and Ethics, our Corporate Governance Guidelines and other related materials. The information on our website is not part of this annual report.

Our Investor Relations Department can be contacted at Aspen Aerogels, Inc., 30 Forbes Road, Northborough, MA 01532, Attention: Investor Relations; telephone: 508-691-1111; e-mail: ir@aerogel.com.

Human Capital Resources

As of December 31, 2023, we had 548 full-time employees. Of our employees, 517 are located in the United States and 31 are located abroad. We consider our current relationship with our employees to be of good standing. None of our employees are represented by labor unions or have collective bargaining agreements. Additionally, we engaged Prodensa Servicios de Consultora to establish OPE Manufacturer Mexico S de RL de CV, a maquiladora located in Mexico, which manufactures thermal barrier PyroThin products and operates an automated fabrication facility for PyroThin.

Compensation and Benefits

At Aspen Aerogels, we view our employees as our most valuable asset and have taken great steps to offer a comprehensive suite of compensation and benefits to ensure the physical, emotional and financial well-being of our employees. Our goal is to attract and retain the best and brightest talent and remain competitive within our industry. Compensation consists of industry and market competitive base salaries as well as a combination of short-term and long-term incentive compensation programs. These short-term and long-term incentive programs, or pay-at-risk compensation, are designed to link outcomes directly to the achievement of individual and financial goals, strategic objectives, and stock price appreciation. Our benefits programs, which vary by location, generally include health and welfare benefits, paid time off, and other key programs to support the general well-being of our employees. A comprehensive paid parental leave program provides Aspen US employees the financial security and flexibility to provide necessary care for themselves and their families; flexibility that improves productivity, job satisfaction and increases employee retention and engagement.

Diversity, Equity and Inclusion

We respect and celebrate our employees by striving to create a diverse and inclusive environment in which people thrive. We need the best minds in the room to propel the next generation of sustainable solutions – key to which is diversity. A more diverse workforce is to our collective benefit as we all gain from tapping into a broader range of experiences, abilities, ideas, and perspectives. Our diversity commitments include bringing more women into leadership positions, focusing our recruitment and retention efforts to achieve more diverse racial and ethnic representation across our organization, and partnering with community organizations to develop a growing workforce that reflects all expressions of individuality and supports the local regions in which we operate.

Community Engagement

Community and caring are at the heart of our culture, and we are proud to give back to the communities where we work and live. Aspen Aerogel employees partner with community-based organizations to participate in local efforts to donate time, money, and goods.

Workforce Health & Safety

Aspen Aerogels is committed to the health, safety and well-being of our employees and the communities in which we operate. Safety and health in our business must be part of every operation. The Company requires a safety-first approach and cooperation in all safety matters, not only between supervisor and employee, but also among employees and contractors.

Business Ethics and Integrity

Our Code of Business Conduct and Ethics provides Aspen Aerogels employees with a clear understanding of the principles of business conduct and ethics that are expected of them and to aid them with a framework for making ethical decisions in compliance with applicable law. It applies to the Company enterprise-wide and to all associates with whom Aspen Aerogels conducts business.

Seasonality

Our energy industrial product offerings make us less susceptible to seasonal patterns as our operating results are generated in part by demand for insulation associated with new-build construction of facilities, capital expansions and related capital projects, and larger maintenance-related projects in the energy industrial market. Historically, our third and fourth quarter results have shown increased levels of revenue, which we believe is associated with our end-user customers' maintenance schedules and timing of capital projects. As we pursue and grow revenue opportunities in the EV market, we expect that a portion of our revenues may be subject to seasonal patterns typical of automotive suppliers.

Environmental Matters

We are subject to federal, state, local and foreign laws and regulations designed to protect the environment and to regulate the discharge of materials into the environment. We believe that our policies, practices, and procedures are properly designed to prevent unreasonable risk of environmental damage and associated financial liability. To date, environmental control regulations have not had a significant adverse effect on our overall operations. See "Risk Factors — We may incur significant costs complying with environmental, health and safety laws and related claims, and failure to comply with these laws and regulations could expose us to significant liabilities, which could adversely affect our results of operations."

Item 1A. RISK FACTORS

Summary of Risk Factors

Our business is subject to numerous risks and uncertainties, including those highlighted in this section below, that represent challenges that we face in connection with the successful implementation of our strategy. The occurrence of one or more of the events or circumstances described in more detail in the risk factors below, alone or in combination with other events or circumstances, may have an adverse effect on our business, cash flows, financial condition and results of operations. Such risks include, but are not limited to:

- We have incurred annual net losses since our inception, and we may continue to incur net losses in the future and may never reach profitability.

- Our efforts in developing, selling, and supplying products in EV market may subject us to increased financial, operational, and legal risks that could materially adversely impact our business, financial conditions, and results of operations and may also increase our costs and make it difficult for us to operate profitably.
- We will require significant additional capital to pursue our growth strategy, but we may not be able to obtain additional financing on acceptable terms or at all.
- Our estimates regarding market opportunity for our products in the EV market and the assumptions on which our financial targets and our planned production capacity increases are based may prove to be inaccurate, which may cause our actual results to materially differ from such targets, which may adversely affect our future profitability, cash flows, and stock price.
- Shortages of the raw materials used in the production of our products, increases in the cost of such materials or disruptions in our supply chain could have a material adverse impact on our financial condition and results of operations.
- Our working capital requirements involve estimates based on demand and production expectations and may decrease or increase beyond those currently anticipated, which could materially harm our results of operations and financial condition.
- The cyclical nature of automotive sales and production can adversely affect our business. Furthermore, disruptions in the components that our customers in the EV market, including our automotive OEM customers, use in their products may adversely affect our business operations and projected revenue.
- Trends in the selection of cell chemistries, battery pack system architectures, and the adoption of active cooling methods may reduce thermal complexities to render the demand for our thermal barrier products less obvious.
- We are currently dependent on a single manufacturing facility. Any significant disruption to this facility or the failure of any one of our three production lines in this facility to operate according to our expectation could have a material adverse effect on our business and results of operations.
- We may not realize sales represented by awarded business. Continued pricing pressures, automotive OEM cost reduction initiatives and the ability of automotive OEMs to re-source or cancel vehicle programs may result in lower than anticipated margins, or losses, which may have a significant negative impact on our business.
- Our supply agreements with our automotive OEM customers are generally requirements contracts, and a decline in the production requirements of any of our customers, could adversely impact our revenues and profitability.
- A sustained downturn in the energy industry, due to lower oil and gas prices or reduced energy demand, could decrease demand for some or all of our products and services, which could have a material adverse effect on our business, financial condition and results of operations.
- The insulation markets we serve are highly competitive. If we are unable to compete successfully, we may not be able to increase or maintain our market share and revenues.
- The qualification process for our products can be lengthy and unpredictable, potentially delaying adoption of our products and causing us to incur significant expense, potentially without recovery.
- Our revenue may fluctuate, which may result in a high degree of variability in our results of operations and make it difficult for us to plan based on our future outlook and to forecast our future performance.
- The results of our operations could be materially adversely affected if our operating expenses incurred do not correspond with the timing of our revenues.
- If we fail to achieve the increase in production capacity that our long-term growth requires in a timely manner, or at all, our growth may be hindered and our business or results of operations may be materially adversely affected.
- If the expected growth in the demand for our products does not follow each of our planned capacity expansions, then our business and results of operations will be materially adversely affected.
- A substantial portion of our revenue comes from sales in foreign countries and we are planning to expand our operations outside of the United States, which subjects us to increased economic, trade, foreign exchange, operational, and political risks that could materially adversely impact our business, financial conditions and results of operations and also increase our costs and make it difficult for us to operate profitably.
- We may face certain product liability or warranty claims on our products, including from improper installation of our products by third parties. Consequently, we could lose existing and future business and our ability to develop, market and sell our insulation could be harmed.

- We may incur significant costs complying with environmental, health and safety laws and related claims, and failure to comply with these laws and regulations could expose us to significant liabilities, which could materially adversely affect our results of operations.
- Breakdowns, security breaches, loss of data, and other disruptions of our information technology systems could compromise sensitive information related to our business, prevent us from accessing critical information, and expose us to liability, which would cause our business and reputation to suffer.
- Our ability to use our net operating loss carryforwards may be subject to limitation, which could result in a higher effective tax rate and adversely affect our financial condition and results of operations.
- We may be adversely affected by the effects of inflation.
- The impact of the Russian invasion of Ukraine and the conflict in the Middle East on the global economy, energy supplies and raw materials is uncertain, but may prove to negatively impact our business and operations.
- Our inability to protect our intellectual property rights and trade secrets could negatively affect our business and results of operations.
- We have initiated intellectual property litigation that is and will continue to be costly, and could limit or invalidate our intellectual property rights, divert time and efforts away from business operations, require us to pay damages and/or costs and expenses and/or otherwise have a material adverse impact on our business, and we could become subject to additional such intellectual property litigation in the future.
- Because we are a public company, we are obligated to develop and maintain proper and effective internal control over financial reporting. If our internal controls over financial reporting are determined to be ineffective, or if our auditors are otherwise unable to attest to their effectiveness, investor confidence in our company, and our common stock price, may be adversely affected.
- Our shareholders may experience future dilution as a result of future equity offerings.

Risks Related to Our Business and Strategy

We have incurred annual net losses since our inception, and we may continue to incur net losses in the future and may never reach profitability.

We have a history of losses, and we may not ever achieve full-year profitability. We experienced net losses of \$45.8 million, \$82.7 million and \$37.1 million for the years ended December 31, 2023, 2022 and 2021, respectively. As of December 31, 2023, our accumulated deficit was \$673.6 million. We expect to continue to incur operating losses as a result of expenses associated with the continued development and expansion of our business. Our expenses include research and development, sales and marketing, and general and administrative costs. Furthermore, these expenses are not the only factors that may contribute to our net losses. For example, interest expense that we incur on any future financing arrangements could contribute to our net losses. Any failure to increase revenue or manage our cost structure as we implement initiatives to grow our business could prevent us from achieving profitability, or sustaining profitability if we do achieve it. In addition, our ability to achieve profitability is subject to a number of risks and uncertainties discussed below, many of which are beyond our control. Failure to become and remain profitable may adversely affect the market price of our common stock and our ability to raise capital and continue operations.

We will require significant additional capital to pursue our growth strategy, but we may not be able to obtain additional financing on acceptable terms or at all.

The growth of our business will depend on substantial amounts of additional capital for expansion of existing production lines or construction of new production lines or facilities, for ongoing operating expenses, for continued development of our Aerogel Technology Platform, or for introduction of new product lines. Our capital requirements will depend on many factors, including the rate of our revenue growth, our introduction of new products and technologies, our enhancements to existing products and technologies, and our expansion of sales and marketing and product development activities. In addition, we anticipate significant cash outlays during 2024 related to maintaining our aerogel manufacturing operations in our East Providence, Rhode Island facility and the construction of our second aerogel plant in Bulloch County, Georgia, among other items. We are planning to raise capital through debt financings, equity financings, partner financings, or technology licensing agreements to fund these operating and capital expenditure requirements in 2024 and beyond. Any such future significant expansion of our aerogel capacity, or similar investment will require us to raise substantial amounts of additional capital. There is no assurance that we will be able obtain any such type of financing on terms acceptable to us or at all and in a timely manner. The current economic landscape resulting in higher interest rates presents further challenges in obtaining financing on acceptable terms or at all.

In addition, we may consider strategic acquisitions of complementary businesses or technologies to grow our business, which would require significant capital and could increase our capital requirements related to future operation of the acquired business or technology.

We may not be able to obtain loans or raise additional capital on acceptable terms or at all. The convertible note issued to an affiliate of Koch, which together with Koch, we refer to as KDT, as well as the Loan Agreement with GM, contain restrictions on our ability to incur additional indebtedness, which, if not waived, could prevent us from obtaining needed capital. Any future credit facilities or debt instruments would likely contain similar or additional restrictions, requirements or conditions. We may not be able to obtain bank credit arrangements or effect an equity or debt financing on terms acceptable to us or at all in order to fund our future capacity expansion plans. Any failure to obtain additional financing when needed could adversely affect our ability to maintain and grow our business.

Our efforts in developing, selling, and supplying products in the EV market may subject us to increased financial, operational, and legal risks that could materially adversely impact our business, financial conditions, and results of operations and may also increase our costs and make it difficult for us to operate profitably.

We have a focus on developing and selling products in the automotive industry, specifically for EV applications. In 2020 and 2021, we entered into contracts with GM to supply our thermal barrier products for use in the battery system of its EVs, and in 2023, we entered into thermal barrier production contracts with Toyota, Scania, ACC, a battery cell joint venture between Stellantis N.V, Saft-TotalEnergies and Mercedes-Benz, and Audi, a luxury brand of the Volkswagen Group. We are currently selling thermal barrier production parts to GM and Toyota, and prototype thermal barrier parts to a number of other companies. We are also continuing our efforts to develop additional thermal barrier products for sale to others in the EV market. As a result of our existing contract with GM and other OEMs, current sales to others in the EV market and any future supply of our products to the automotive industry, including through specific contracts, we are subject to a number of risks, including, but not limited to:

- Under our contracts with the GM, they are not obligated to make any purchases from us and may terminate the contract at any time. There can be no assurance that significant revenue, or any revenue at all, will result from the contract.
- In order to support the projections and estimates of our product demand that our potential automotive customers present to us, we may need to make substantial capital and other investments without any assurance that such potential demand will materialize. For example, under the contract with GM, we are obligated to supply products up to a daily maximum quantity even without a specific purchase commitment. This requires us to invest in capacity, infrastructure and personnel. These investments could result in substantial capital expenditures without any commensurate increase in revenue, or any increase at all. Even if significant sales of our products to automotive OEMs materialize, the need to make these significant capital investments, as well as the costs related to developing these products and related process and manufacturing developments, and the costs of meeting the stringent requirements of the automotive industry, could result in sales to the automotive industry being significantly less profitable than we expect, or potentially unprofitable.
- Automotive OEMs require that we timely meet stringent requirements with respect to capital investment and quality standards in connection with our efforts to develop, sell and support products for use in the EV market. We may not be able to meet these requirements on a timely basis or at all.
- Automotive OEMs require suppliers of various tiers to assume liability for ordinary warranty expenses and product liability issues that are not necessarily commensurate with the roles the supplier played in the development of the final product sold to the consumer. This could expose us to significantly greater risk of liability for warranty expenses and/or for defects, failures or accidents involving the final products sold to the consumer.
- Automotive OEMs purchasing from us may have certain rights to intellectual property developed by us in connection with our work for that OEM. These rights could permit the OEM to purchase products similar to ours from other third party suppliers or to develop internally products that could replace our products in their manufacturing process.
- We face significant competition in selling our products to the automotive industry and anticipate that competition increasing over time, both from products similar to ours and from other technologies that may address in a superior fashion the technical issues currently addressed by our products. In particular, we face significant competition from Chinese firms, many of whom have longstanding experience in supplying EV OEMs and are part of a Chinese EV industry that we believe is in many ways more mature than the EV industry in the United States and other markets. In order to compete with such firms and sustainably participate in the automotive market, we will have to overcome the advantages possessed by those Chinese firms.
- EVs and battery technologies are evolving at a rapid pace. They may evolve in such a way as to render our products obsolete. While we are

investing considerable capital and other resources based on what we believe to be the currently identified needs of the industry, our belief as to the current needs of the industry may be incorrect or our technology, products or other resources may not be applicable to the future needs of the industry.

Our ability to successfully sell our products to the automotive industry will depend in large part on our ability to manage these and other risks.

If we fail to successfully construct and operate our planned second manufacturing facility in Bulloch County, Georgia and increase our production capacity that our continued and anticipated growth requires in a timely manner, or at all, our growth may be hindered and our business or results of operations may be materially adversely affected.

We have projected significant increase in the demand for our aerogel products, driven by our expected growth in the EV market and sales to our automotive OEM customers. Our continued growth requires that we increase our production capacity. To meet expected growth in demand for our aerogel products in the EV market, we have been in the process of expanding our aerogel blanket capacity by constructing a second manufacturing plant in Bulloch County, Georgia. However, in order to manage the development of the second plant so that its increased capacity comes online in a manner that aligns with our current expectations of demand from our EV customers, we are extending the timeframe for construction and commissioning of the second plant until such time as its capacity is supported by increased demand. In the meantime, and until we ramp up construction, we expect to be able to substantially reduce our planned capital expenditures for 2024. At the same time, we believe that productivity improvements in our existing Rhode Island facility combined with our supplement supply of our energy industrial products from one or more external manufacturing facilities in China will permit us to achieve a target revenue capacity of approximately \$650 million in 2024 and prior to the completion and start-up of the second plant. Nonetheless, there can be no assurance as to when we will ramp up construction on the second plant. There can also be no assurance that our contract manufacturing strategy of meeting the demand of our energy industrial customers with supply from one or more external manufacturing facilities in China will provide us with adequate manufacturing capacity or supply for that expected demand. Furthermore, when we ramp up construction on the second plant, further cost inflation and/or supply chain disruptions, as well as potential changes in the scope of the facilities, could lead to increases to our prior estimated costs for completion of the second plant.

Many factors could delay or prevent the construction of a second manufacturing facility or cause us to reduce the scale or scope of the new facilities, including:

- increases in the cost of construction;
- our inability to obtain financing on favorable terms, or at all;
- design, engineering and construction difficulties or delays;
- our failure or delay in obtaining necessary legal, regulatory, and other approvals;
- interruptions in the supply of the necessary equipment, or construction materials or labor or an increase in their price;
- opposition of local interests; and
- natural disasters, accidents, political unrest, or unforeseen events.

Many factors could prevent the second manufacturing facility from producing at their expected effective or nameplate capacity or could cause us to reduce the scale or scope of the new facilities, including:

- design and engineering failures;
- inability to retain and train a skilled workforce;
- the challenges of operating significantly higher volume equipment at the planned second facility than currently employed at our existing facility in East Providence;
- improper operation of the manufacturing equipment;
- decreases in our manufacturing yields due to the inefficient use of the materials needed to make our products in our manufacturing process;
- the availability of raw materials to support the levels of production that we anticipate at these facilities;
- strikes or labor disputes; and
- damage to the manufacturing equipment due to design and engineering flaws, construction difficulties or operator error.

Any such expansion will place a significant strain on our senior management team and our financial and other resources. The costs associated with and the resources necessary for our expansion could exceed our expectations and result in a materially adverse impact on our business, results of operations, financial condition and cash flows. If we are unable to complete the project contemplated, the costs incurred in connection with such projects may not be recoverable.

We have engaged third-party external manufacturing facilities in China to supplement our supply of our energy industrial products. If such external manufacturing facilities are unable to manufacture and deliver a sufficient quantity of high-quality products on a timely and cost-efficient basis, our net revenue and business operations may be harmed and our reputation may suffer.

We have engaged external manufacturing facilities in China for a supplemental supply of our energy industrial products, which we believe will enable us to achieve a target revenue capacity of approximately \$650 million in the near-term and prior to the completion and start-up of our planned second manufacturing plant. If our external manufacturing facilities are unable to deliver the required aerogel product on a timely basis, we may experience delays in delivering our finished aerogel product to customers in the energy industrial market. In addition, because our third-party external manufacturing facilities have manufacturing facilities in China, their ability to provide us with adequate supplies of high-quality products on a timely and cost-efficient basis is subject to a number of additional risks and uncertainties, including political, social and economic instability and other factors that could impact the shipment of supplies. If our manufacturers are unable to provide us with adequate supplies of high-quality aerogel products on a timely and cost-efficient basis, our operations could be disrupted and our revenue and business operations may suffer. Moreover, if our third-party external manufacturing facilities cannot consistently produce high-quality products that are free of defects and/or violates applicable worker or product safety rules, regulations or laws, we may experience a loss of customers, which may also reduce our revenues and may harm our reputation and brand. Furthermore, our third-party external manufacturing facilities may become subject to various supply chain disruptions, including for key inputs into their manufacturing process such as methanol. Such disruptions could be the result of pandemics or public health crises, and/or geopolitical disputes and conflicts, any of which could slow or halt the delivery of products to us and increase the price of certain materials due to resulting increases in costs of raw materials and shipping costs.

We are party to a production contract with a contract manufacturer in China to produce certain of our Energy Industrial products. Pursuant to the contract, the contract manufacturer is obligated to deliver products to us as we issue purchase orders on an as needed basis through the term of the agreement, which expires in 2024. The term of the contract will automatically extend for additional one-year periods unless either party notifies the other of its intention not to renew the contract. While we have agreed to purchase our requirement for certain Energy Industrial products from the contract manufacturer, we have no obligation to purchase any minimum quantity under the contract. In addition, we may terminate the contract at any time and for any or no reason. As of December 31, 2023, we had open purchase orders with the contract manufacturer of approximately \$3.2 million.

Our estimates regarding market opportunity for our products in the EV market and the assumptions on which our financial targets and our planned production capacity increases are based may prove to be inaccurate, which may cause our actual results to materially differ from such targets, which may adversely affect our future profitability, cash flows, and stock price.

Our estimates regarding market opportunity for our products in the EV market, the assumptions underlying our estimates regarding market opportunity and our financial targets, including any revenue targets we may provide from time to time, are dependent on certain estimates and assumptions related to, among other things, demand for our products from our automotive OEM customers, development and launch of innovative new products, market share projections, product pricing and sale, volume and product mix, volatility, material prices, distribution, cost savings, and our ability to generate sufficient cash flow to reinvest in our existing business. The estimates and financial targets and our planned production capacity increases are based on estimates that our management believes are reasonable with respect to our future results of operations, based on present circumstances, and have not been reviewed by our independent accountants. Some assumptions upon which the estimates and financial targets are based, however, invariably will not materialize due to the inevitable occurrence of unanticipated events and circumstances beyond our management's control or the occurrence of events that were believed to be less likely to occur. Our estimates regarding market opportunity and our financial targets are based on historical experience and on various other estimates and assumptions that we believe to be reasonable under the circumstances and at the time they are made, and our actual results may differ materially from our expectations. Any material variation between our estimates and financial targets and our actual results may adversely affect our future profitability, cash flows and stock price.

We have yet to achieve positive total cash flow, and our ability to generate positive cash flow is uncertain.

To develop and expand our business, we have made, and will need to continue to make, significant up-front investments in our manufacturing capacity and have incurred research and development, sales and marketing and general and administrative expenses. In addition, our growth has required a significant investment in working capital. We experienced negative cash flows from operating activities of \$42.6 million, \$94.4 million and \$18.6 million for the years ended December 31, 2023, 2022 and 2021, respectively. The negative cumulative cash flows from operating activities during the three-year period were exacerbated by cash flows used in investing activities to maintain, enhance and expand our manufacturing operations during the same time period. As a result, we experienced negative total cash flows during the three-year period.

We expect our operating cash flow will be positive on an annual basis during 2024. In addition, we anticipate that we will incur significant cash outlays related to maintaining our aerogel manufacturing operations in our East Providence, Rhode Island facility and the construction of our new plant in Bulloch County, Georgia. We are planning to raise capital through debt financings, equity financings, partner financings, government grant and loan programs, or technology licensing agreements to fund these capital expenditure requirements in 2024, and beyond. However, we expect that our existing cash balance or cash balance after any such financing, alone, may periodically be insufficient to fund these operating, capital expenditure or working capital requirements.

In addition, we may not achieve sufficient revenue growth to generate positive cash flow in 2024 or any future year. As a result, we may need to raise additional capital from investors to achieve our expected growth or to fund the working capital investment necessary to maintain operations. Any inability to generate positive future cash flow, to borrow funds or to raise additional capital on reasonable terms, if at all, may harm our short-term financial condition or threaten our long-term viability.

Our working capital requirements involve estimates based on demand and production expectations and may decrease or increase beyond those currently anticipated, which could materially harm our results of operations and financial condition.

In order to fulfill the product delivery requirements of our direct and end-user customers, we plan for working capital needs in advance of customer orders. In particular, our OEM customers estimate and place their orders significantly in advance of the time they are needed, requiring us to plan our working capital needs well in advance of delivering their orders. As a result, we base our funding and inventory decisions on estimates of future demand. If demand for our products does not increase as quickly as we have estimated or drops off sharply, our inventory and expenses could rise, and our business and results of operations could suffer. Alternatively, if we experience sales in excess of our estimates, which has occurred in previous reporting periods, our working capital needs may be higher than currently anticipated. Additionally, in the early years of EV adoption, our EV customers' forecasts may be prone to multiple and frequent revisions resulting in changing demand levels. Our ability to meet this excess or changing customer demand depends on our ability to arrange for additional financing for any ongoing working capital shortages, since it is likely that cash flow from sales will lag behind these investment requirements. If we are unable to obtain adequate financing when needed, it could adversely affect our ability to invest in the working capital required to maintain and grow our business.

The terms of the Loan Agreement with GM and our convertible note arrangement with KDT require us to meet certain operating covenants and/or place restrictions on our operating and financial flexibility. If we raise additional capital through debt financing, the terms of any new debt could further restrict our ability to operate our business.

On November 28, 2022, our wholly owned subsidiary, Aspen Aerogels Georgia, LLC, or the Borrower, entered into a Loan Agreement, by and between (i) the Borrower, (ii) Aspen Aerogels, Inc. and (iii) Aspen Aerogels Rhode Island, LLC, a Rhode Island limited liability company, or Aspen RI, and, together with the Borrower and Aspen Aerogels, Inc., each, a Loan Party and collectively, the Loan Parties), as guarantors, and (iv) GM, as lender, which was amended on September 28, 2023 (the "Loan Agreement"). The Loan Agreement provides for a multi-draw senior secured term loan in an aggregate principal amount of up to \$100.0 million, or the Loan, available to the Borrower to draw on a delayed draw basis for a period beginning on the date that is twelve (12) months prior to the date agreed upon by Borrower and GM for the start of production at an aerogel manufacturing facility in Bulloch County, Georgia under the applicable GM Purchase Contracts (as defined in the Loan Agreement) and ending on March 31, 2024, subject to certain conditions precedent to funding. The Loan to be advanced under the Loan Agreement is guaranteed by us and secured by a security interest in and first-priority lien on substantially all of our assets, other than our intellectual property, certain pumps pledged to secure an EDGE grant from the Georgia Department of Community Affairs to the Borrower and other customary collateral exclusions. The Loan Agreement contains affirmative and negative covenants as well as financial covenants and events of default that are customary in credit agreements and construction financing documents. Affirmative covenants include, among others, reporting obligations and an affirmative covenant requiring that proceeds of the Loan are used solely in accordance with the Budget delivered to GM in accordance with the terms of the Loan Agreement. Negative covenants include, among others, covenants restricting us from transferring all or any part of our business or property (including intellectual property), incurring additional indebtedness, except for certain permitted indebtedness, engaging in mergers or acquisitions, repurchasing shares, paying dividends or making other distributions, making investments, and creating other liens on our assets (including our intellectual property), in each case

subject to customary exceptions and baskets. If we raise any additional debt financing, the terms of such additional debt could further restrict our operating and financial flexibility. These restrictions may include, among other things, limitations on borrowing and specific restrictions on the use of the proceeds of such additional debt financing, as well as prohibitions on our ability to incur further debt financing, create liens, pay dividends, redeem capital stock or make investments. Additionally, our convertible note arrangement with KDT contains certain restrictions on our ability to operate, including our ability to incur indebtedness. Our board or management team could believe that taking any one of these actions would be in our best interests and the best interests of our stockholders. If that were the case and if we were unable to complete any of these actions because GM and/or KDT do not provide its consent, it could adversely impact our business, financial condition and results of operations. Financial covenants in the Loan Agreement include the following, measured starting from the fiscal quarter ending December 31, 2024 and at the end of each fiscal quarter thereafter (each such fiscal quarter end, a “Test Date”): (A) a covenant requiring that the Total Leverage Ratio (as defined in the Loan Agreement) shall not exceed 5.00:1.00 as of the applicable Test Date and (B) a covenant requiring that the ratio of our total indebtedness (with certain exceptions) to our consolidated equity shall not be greater than 1.20x as of the applicable Test Date, in each case, with compliance demonstrated through the submission of a certain compliance certificate (the “Financial Covenants”), subject to customary equity cure rights with respect to the Financial Covenants.

If we default under the terms of the Loan Agreement beyond the applicable grace period, if any, GM may declare all amounts outstanding under the Loan Agreement to be immediately due and payable and terminate all unused commitments to extend further credit under the Loan Agreement. If we are unable to repay the amounts due under the Loan Agreement upon such GM’s declaration, GM could proceed against the collateral granted to it to secure the obligations under the Loan Agreement (including, but not limited to taking control of our pledged assets and foreclosing on other collateral). In the event of a default under the terms of the Loan Agreement, GM could also require us to renegotiate the Loan Agreement on terms less favorable to us. Either the enforcement by GM upon its declaration to accelerate the obligations under the Loan Agreement or the renegotiation of the Loan Agreement’s terms, each as mentioned above, could adversely affect our operations. Further, if we are liquidated, GM’s right to repayment, as well as the right to repayment of other lenders under any additional debt financing, would be senior to the rights of the holders of our common stock. GM’s interests as a lender may not always be aligned with our interests. If our interests come into conflict with those of GM, including in the event of a default or an Event of Default (as defined in the Loan Agreement) under the Loan Agreement, GM may choose to act in its self-interest, which could adversely affect the success of our current and future collaborative efforts with GM.

The cyclical nature of automotive sales and production can adversely affect our business. Furthermore, disruptions in the components that our customers in the EV market, including our automotive OEM customers, use in their products may adversely affect our business operations and projected revenue.

Our thermal barrier business, which is projected to grow significantly in the coming years, is directly related to sales and vehicle production by our automotive OEMs. A reduction in automotive sales and production could cause our automotive OEM customers to reduce their orders of our products. Automotive sales and production are highly cyclical and are dependent on general economic conditions, customer confidence, and consumer preferences. Lower global automotive sales would be expected to result in our automotive OEM customers having reduced vehicle production schedules, which has a direct impact on our revenues generated from this portion of our business. Automotive sales and production can also be affected by labor relation issues, regulatory requirements, trade agreements, the availability of consumer financing and supply chain disruptions. Our customers in the EV market, particularly our automotive OEM customers, use a broad range of materials and supplies and are reliant on a global supply chain. A significant disruption in the global supply chain may cause them to halt or delay production, which in turn would reduce their requirements of our aerogel thermal barrier or delay their orders. We have no control over these disruptions in supply chain and the resulting delay or reduction in our customers’ orders. Any such delay or reduction would adversely impact our targets of awarded business for our thermal barriers and other products. Our sales are also affected by inventory levels and OEMs’ production levels. We cannot predict when OEMs will decide to increase or decrease inventory levels or whether new inventory levels will approximate historical inventory levels. Uncertainty and other unexpected fluctuations could have a material adverse effect on our business and financial condition.

Trends in the selection of cell chemistries, battery pack system architectures, and the adoption of active cooling methods may reduce thermal complexities to render the demand for our thermal barrier products less obvious. Furthermore, changes by our automotive OEM customers in the cell form factor may have a direct impact on the demand for our product.

Energy density requirements for EV batteries have been consistently increasing, the resulting choice of cell chemistries and pack architectures have typically presented more demanding thermal problems that our thermal barrier products are designed to address. However, due to the safety issues, we believe that some vehicle manufacturers tend to select less thermally demanding and inherently safer cell chemistries and design choices at the expense of lower energy densities and lower driving range. Such systems may not present a demanding thermal problem requiring solutions like our thermal barrier products. If the EV landscape evolves in such direction, the demand for our products will not materialize or not meet our current forecasts, plans and expectations, which will have a material adverse effect on our business and operations.

Our current thermal barrier product is compatible with pouch and prismatic cells, but not cylindrical cells. Currently, one of our automotive OEMs, GM, plans to use pouch and prismatic cells in its future EVs under its primary Ultium platform, which we expect will be a significant source of demand for our products. If GM were to switch to using cylindrical cells for their primary Ultium platform, our current thermal barrier product would not be compatible, resulting in reduced demand for our product from one of our key automotive OEM customers, which would adversely affect our business and results of operations.

Adverse developments affecting the financial services industry, such as actual events or concerns involving liquidity, defaults or non-performance by financial institutions or transactional counterparties, could adversely affect our current and projected business operations and its financial condition and results of operations.

Actual events involving limited liquidity, defaults, non-performance or other adverse developments that affect financial institutions, transactional counterparties or other companies in the financial services industry or the financial services industry generally, or concerns or rumors about any events of these kinds or other similar risks, have in the past and may in the future lead to market-wide liquidity problems. For example, on March 10, 2023, Silicon Valley Bank, or SVB, was closed by the California Department of Financial Protection and Innovation, which appointed the Federal Deposit Insurance Corporation, or the FDIC, as receiver. As of February 29, 2024, we held approximately \$2.5 million of our cash and cash equivalents and restricted cash at SVB.

Inflation and rapid increases in interest rates have led to a decline in the trading value of previously issued government securities with interest rates below current market interest rates. Although the U.S. Department of Treasury, FDIC and Federal Reserve Board have announced a program to provide up to \$25 billion of loans to financial institutions secured by certain of such government securities held by financial institutions to mitigate the risk of potential losses on the sale of such instruments, widespread demands for customer withdrawals or other liquidity needs of financial institutions for immediate liquidity may exceed the capacity of such program. There is no guarantee that the U.S. Department of Treasury, FDIC and Federal Reserve Board will provide access to uninsured funds in the future in the event of the closure of other banks or financial institutions, or that they would do so in a timely fashion.

Although we assess our banking relationships as we believe necessary or appropriate, our access to funding sources and other credit arrangements in amounts adequate to finance or capitalize our current and projected future business operations could be significantly impaired by factors that affect us, the financial institutions with which we have arrangements directly, or the financial services industry or economy in general. These factors could include, among others, events such as liquidity constraints or failures, the ability to perform obligations under various types of financial, credit or liquidity agreements or arrangements, disruptions or instability in the financial services industry or financial markets, or concerns or negative expectations about the prospects for companies in the financial services industry. These factors could involve financial institutions or financial services industry companies with which we have financial or business relationships, but could also include factors involving financial markets or the financial services industry generally.

The results of events or concerns that involve one or more of these factors could include a variety of material and adverse impacts on our current and projected business operations and our financial condition and results of operations. These could include, but may not be limited to, the following:

- Delayed access to deposits or other financial assets or the uninsured loss of deposits or other financial assets;
- Loss of access to revolving existing credit facilities or other working capital sources and/or the inability to refund, roll over or extend the maturity of, or enter into new credit facilities or other working capital resources;
- Potential or actual breach of contractual obligations that require us to maintain letters of credit or other credit support arrangements; or
- Termination of cash management arrangements and/or delays in accessing or actual loss of funds subject to cash management arrangements.

In addition, investor concerns regarding the U.S. or international financial systems could result in less favorable commercial financing terms, including higher interest rates or costs and tighter financial and operating covenants, or systemic limitations on access to credit and liquidity sources, thereby making it more difficult for us to acquire financing on acceptable terms or at all. Any decline in available funding or access to our cash and liquidity resources could, among other risks, adversely impact our ability to meet our operating expenses, financial obligations or fulfill our other obligations, result in breaches of our financial and/or contractual obligations or result in violations of federal or state wage and hour laws. Any of these impacts, or any other impacts resulting from the factors described above or other related or similar factors not described above, could have material adverse impacts on our liquidity and our current and/or projected business operations and financial condition and results of operations.

In addition, any further deterioration in the macroeconomic economy or financial services industry could lead to losses or defaults by parties with whom we conduct business, which in turn, could have a material adverse effect on our current and/or projected business operations and results of operations and financial condition. For example, a party with whom we conduct business may fail to make payments when due, default under their agreements with us, become insolvent or declare bankruptcy. Any bankruptcy or insolvency, or the failure to make payments when due, of any counterparty of ours, or the loss of any significant relationships, could result in material losses to us and may have material adverse impacts on our business.

Our business, results of operations and financial condition could be materially adversely affected by the effects of widespread public health epidemics, including coronavirus and the resulting COVID-19 pandemic, that are beyond our control.

Any outbreaks of contagious diseases, public health epidemics, and other adverse public health developments in countries where we, our customers, and suppliers operate could have a material and adverse effect on our business, results of operations, and financial condition. The novel strain of the coronavirus affecting the global community, including the United States, is expected to continue to impact our operations, and the nature and extent of the impact may be highly uncertain and beyond our control. In particular, our sales globally, including to customers in the energy industrial and sustainable insulation materials markets that are impacted by the COVID-19 pandemic, are being negatively impacted as a result of disruption in demand, which could have a material adverse effect on our business, results of operations and financial condition. The COVID-19 pandemic has resulted in significant volatility in the price of oil and has reduced the demand for our products used in energy industrial facilities. We have also faced market-based challenges in the hiring and retention of non-exempt labor in our East Providence, Rhode Island manufacturing facility during 2021 that has limited our manufacturing output and has delayed the fulfillment of customer orders. In addition, suppliers of our raw materials have intermittently been unable to supply the materials that we require to manufacture our products according to our schedules. The future impact of similar COVID-19 related disruptions to our business cannot be accurately estimated at this time. The COVID-19 pandemic may also impact automotive sales and production by our automotive OEM customers, which in turn affects our ability to realize the awarded business and our business operations.

Uncertain factors relating to the COVID-19 pandemic include the duration of the outbreak, the severity of the disease, the effect of various mutated variants of the virus in circulation, the availability of vaccines, the rate of vaccination in the various geographies, and the actions, or perception of actions that may be taken, to contain or treat its impact, including declarations of states of emergency, business closures, manufacturing restrictions and a prolonged period of travel, commercial and/or other similar restrictions and limitations. While the potential economic impact of the coronavirus outbreak may be difficult to assess or predict, a widespread pandemic could result in significant or sustained disruption of global financial markets, reducing our ability to access capital, which could in the future negatively affect our liquidity. In addition, while we believe we have taken appropriate steps to maintain a safe workplace to protect our employees from contracting and spreading the coronavirus, including following the guidance set out from both the Occupational Safety and Health Administration and Centers for Disease Control and Prevention, we may not be able to prevent the spread of the virus among our employees, face litigation or other proceedings making claims related to unsafe working conditions, inadequate protection of our employees or other claims. Any of these claims, even if without merit, could result in costly litigation or divert management's attention and resources. Furthermore, we may face a sustained disruption to our operations due to one or more of the factors described above.

We may not realize sales represented by awarded business.

We estimate awarded business for our thermal barrier business using certain assumptions, including projected future sales volumes. Our customers in the EV market generally do not guarantee volumes. In addition, awarded business typically includes business under arrangements that our customers in the EV market have the right to terminate without penalty. Therefore, our actual sales volumes, and thus the ultimate amount of revenue that we derive from such sales, are not committed. If actual production orders from our EV market customers are not consistent with the projections we use in calculating the amount of our awarded business, we could realize substantially less revenue over the life of these projects than the currently projected estimates and our financial targets developed based on such estimates.

Continued pricing pressures, automotive OEM cost reduction initiatives and the ability of automotive OEMs to re-source or cancel vehicle programs may result in lower than anticipated margins, or losses, which may have a significant negative impact on our business.

Cost-cutting initiatives adopted by our customers in the EV market or our automotive OEM customers result in increased downward pressure on pricing. In addition, our customers in the EV market often reserve the right to terminate their supply contracts for convenience, which enhances their ability to obtain price reductions. Automotive OEMs also possess significant leverage over their suppliers, including us, because the automotive technology and component supply industry is highly competitive, serves a limited number of customers, has a high fixed cost base and historically has had excess capacity. Based on these factors, and the fact that our automotive OEM customers' product programs are anticipated to encompass large volumes, our customers are able to negotiate

favorable pricing. Accordingly, we are subject to substantial continuing pressure from automotive OEMs to reduce the price of our products. It is possible that pricing pressures beyond our expectations could intensify as automotive OEMs pursue restructuring and cost-cutting initiatives. If we are unable to generate sufficient production cost savings in the future to offset price reductions, our gross margin and profitability would be adversely affected.

Our supply agreements with our automotive OEM customers are generally requirements contracts, and a decline in the production requirements of any of our customers, including as a result of a shift in their strategy or change in their battery form factor, could adversely impact the automotive OEM's demand for our products, which could adversely impact our revenues and profitability.

We receive automotive OEM purchase orders for specific components supplied for particular vehicles. Typically, our automotive OEM customers agree to purchase their requirements for specific products but are not required to purchase any minimum quantity of products from us. Therefore, a significant decrease in demand for certain key models or group of related models sold by any of our automotive OEM customers, a shift in our automotive OEM customers' strategy or change in their battery form factor, or the ability of a manufacturer to re-source and discontinue purchasing from us, for a particular model or group of models, could have a material adverse effect on us and reduce the value of the awarded business. For example, a report by a Korean trade publication recently resulted in market-wide speculation that GM is considering using a cylindrical cell form factor instead of pouch and prismatic cells in its future EVs under their primary Ultium platform. Our current thermal barrier product is compatible with pouch and prismatic cells, but not cylindrical cells. While we have not received any indication from GM or otherwise that there is any such contemplated change in the form factor for GM's primary Ultium platform, such a shift or similar events could result in reduced demand for our product from our automotive OEM customers, which would adversely affect our business and results of operations. To the extent that we do not maintain our existing business with our automotive OEM customers because of a decline in their production requirements or because the contracts expire or are terminated for convenience, we will need to attract new customers or win new business with existing customers, or our results of operations and financial condition as well as the value of the awarded business will be adversely affected.

We are currently dependent on a single manufacturing facility located in East Providence, RI, as well as our third-party external manufacturing facilities in China. Any significant disruption to these facilities or the failure of any one of our three production lines in our East Providence, RI facility to operate according to our expectation could have a material adverse effect on our business and results of operations.

We are building a second manufacturing facility in Bulloch County, Georgia. Until such time that we start up the second aerogel plant, if ever, we are reliant on the three production lines in a single manufacturing facility located in East Providence, Rhode Island as well as our third-party external manufacturing facilities in China to meet our customers' demands, including our automotive OEM customers' demands. Our ability to meet the demands of our customers depends on efficient, proper and uninterrupted operations at this manufacturing facility and the timely construction and operation of our second manufacturing facility. Currently, our second planned manufacturing facility is not expected to have the ability to manufacture the type of aerogel products that we sell to customers in our energy industrial and sustainable insulation materials business. To manufacture products needed for these customers, we would need to install additional equipment at our planned second manufacturing facility, which is not contemplated at this time. Accordingly, in the event of a significant disruption to our sole manufacturing facility or third-party external manufacturing facilities in China, or breakdown of any of the production lines at our sole manufacturing facility in East Providence, RI, we currently do not expect that we would have sufficient inventory in stock to meet demand until the production lines return to operation or our third-party external manufacturing facilities in China deliver the required aerogel products. Furthermore, until such time as our second manufacturing facility in Bulloch County, Georgia is operational and we achieve our expected maximum capacity at the plant, if ever, meeting the expected demand for our thermal barrier product from our automotive OEM customers may result in us not having sufficient manufacturing capacity to meet all the demand from customers in our energy industrial and sustainable insulation materials business, which could adversely impact our business and results of operations.

Power failures or disruptions, the breakdown, failure, or substandard performance of equipment, or the damage or destruction of buildings and other facilities due to fire or natural disasters could severely affect our ability to continue our operations. In the event of such disruptions, we are unlikely to find suitable alternatives or may not be able to make needed repairs on a timely basis and at reasonable cost, which could have a material adverse effect on our business and results of operations. In particular, our manufacturing processes include the use of high pressures, high temperatures, and flammable chemicals, which subject us to a significant risk of loss resulting from fire, spill, or related event. We had occasional incidences of fires at our initial facility in Northborough, Massachusetts that preceded our current manufacturing facility in East Providence, Rhode Island.

If our manufacturing facility or any equipment therein were to be damaged or cease operations, it may reduce revenue, cause us to lose customers, and otherwise adversely affect our business. The insurance policies we maintain to cover losses caused by fire or natural disaster, including business interruption insurance, may not adequately compensate us for any such losses and will not address a loss of customers that we expect would result or may have large deductibles insufficient to support our continuing operations.

Shortages of the raw materials used in the production of our products, increases in the cost of such materials or disruptions in our supply chain could have a material adverse impact on our financial condition and results of operations.

The raw materials used in the production of our products consist primarily of fiber battings, silica precursors and other additives. In addition, the production process requires the use of process gases and other materials typical to the chemical processing industry, as well as access to electricity, natural gas, water, and other basic utilities. Although we are not dependent on a single supplier, we are dependent on the ability of our third-party suppliers to supply such materials on a timely and consistent basis. While these materials and utilities are available from numerous sources, they may be, and have been in the past, subject to fluctuations in availability and price. For example, during the year ended December 31, 2018 and again during the year ended December 31, 2021, we experienced significant increases in the costs of certain silica precursor materials, which constituted over 50% of our raw material costs.

In addition, our third-party suppliers may not dedicate sufficient resources to meet our scheduled delivery requirements or our suppliers may not have sufficient resources to satisfy our requirements during any period of sustained or growing demand. Failure of suppliers to supply, delays in supplying or disruptions in the supply chain for our raw materials, or adverse allocations in the supply of certain high demand raw materials could materially adversely affect the results of our operations. Supply disruptions may affect our ability to meet contractual commitments or delivery schedules on a timely basis and could materially negatively impact our results of operations. For example, during 2021, pursuant to force majeure notifications, our primary carbon dioxide gas suppliers temporarily curtailed supply of carbon dioxide to us due to a feedstock issue impacting the northeastern United States. During this period, the supply disruption required that (i) we make special arrangements to procure carbon dioxide from alternative suppliers outside the region often at higher costs and incur additional transportation expenses, and (ii) we intermittently idle a portion of our manufacturing equipment thereby reducing our production volume and adversely impacting our results of operation.

Most of our raw materials are procured through individual purchase orders or short-term contracts and not through long-term contracts that ensure a fixed price or guaranteed supply for an extended period. This procurement strategy may not support sustained long-term supply chain stability. Fluctuations in the prices of these raw materials could have a material adverse effect on our results of operations. Our suppliers also seek alternative uses for our raw materials at higher price points. Such competitive uses for our raw materials create material price and availability risks to our business. In addition, our ability to pass increases in raw material prices on to our customers is limited due to competitive pricing pressure and the time lag between the increase in costs and the implementation of related price increases.

In particular, we purchase a variety of silica precursors from several suppliers, mostly pursuant to individual purchase orders or short-term contracts and not pursuant to long-term contracts. We do not have a secure, long-term supply of all of our silica precursors. We may not be able to establish arrangements for secure, long-term silica precursor supplies at prices consistent with our current costs or may incur a delay in supply while we seek alternative sources. From time-to-time, we experienced a significant increase in the price of certain silica precursors due to a supply imbalance or other factors in the silanes market. While we seek to reformulate our products to reduce our reliance on materials that are susceptible to significant price fluctuations, while maintaining appropriate performance characteristics, our efforts may not be successful. Any inability to continue to purchase silica precursors without long-term agreements in place, or to establish a long-term supply of silica precursors at prices consistent with our current cost estimates, would have a material adverse effect on our ability to increase our sales and achieve profitability.

We are also projecting significant revenue growth associated with the expected demand for PyroThin thermal barriers in the EV market. To keep pace with this anticipated growth, we are expanding our manufacturing capacity by constructing a second aerogel plant in Bulloch County, Georgia and an automated fabrication operation in Mexico. We are also planning to expand the supply of raw materials available to us by securing commitments to expand supply from existing raw material suppliers, by identifying and qualifying additional suppliers of critical raw materials, and by potentially investing in the assets and hiring the personnel required to produce certain critical raw materials directly in our second aerogel plant. However, our efforts to expand the supply of raw materials may not be successful or could lead to significant increase in our raw material costs. Any such failure or increase in raw material costs would have a material adverse effect on our ability to increase our sales or to achieve profitability.

In light of the increased demand for many of our raw materials, we have expanded our supplier base beyond North America, to Europe and Asia, and specifically to China. We do not have considerable experience managing issues arising out of this globalized supply chain and these risks are significantly magnified during current global supply chain disturbances. If such disturbances persist and manifest in different forms, they present additional substantial operational difficulties that would have a material adverse effect on our ability to meet our customer demands or fulfill our contractual obligations to our customers.

Additionally, our suppliers may prioritize their resources for any long-term commitments to third parties and to our detriment. We may not be in a position to find alternate suppliers in a timely manner to continue to operate consistent with our obligations to or expectations of our customers.

We may encounter manufacturing challenges in the EV market.

The volume and timing of sales to our customers in the EV market may vary due to a wide range of factors, including but not limited to, variation in demand for our customers' products; our customers' attempts to manage their inventory; design changes; changes in our customers' manufacturing strategy; our customers' production schedules; acquisitions of or consolidations among customers; and disruptions in the supply of raw materials or other supplies used in our customers' products. Due in part to these factors, we believe that many of our automotive OEM customers and customers in the EV market do not commit to long-term production schedules. Our inability to forecast the level of customer orders with certainty makes it difficult to schedule production and maximize utilization of manufacturing capacity.

In order to meet the anticipated demand in the EV market, we are planning to construct a second manufacturing plant in Bulloch County, Georgia, to expand our aerogel capacity. Any delays or disruptions in constructing the second manufacturing plant would directly impact our ability to meet such customer demand and adversely impact our business operations and the value of the awarded business.

From time to time, we have underutilized our manufacturing lines. This excess capacity means we incur increased fixed costs in our products relative to the net revenue we generate, which could have an adverse effect on our results of operations, particularly during economic downturns. If we are unable to improve utilization levels for these manufacturing lines and correctly manage capacity, the increased expense levels will have an adverse effect on our business, financial condition and results of operations. In addition, we are operating a fabrication facility in Mexico. Facilities located in Mexico or other countries are subject to a number of additional risks and uncertainties, including increasing labor costs, which may result from market demand or other factors, political, social and economic instability, difficulty in enforcing agreements, or unexpected changes in laws, regulations or policy. Additionally, our manufacturing activities in Mexico may also be adversely affected by political events, terrorist events and hostilities, complications due to natural, nuclear or other disasters or the spread of an infectious disease, virus or other widespread illness. These uncertainties could have a material adverse effect on the continuity of our business and our results of operations and financial condition.

Existing free trade laws and regulations, such as the United States-Mexico-Canada Agreement, provide certain beneficial duties and tariffs for qualifying imports and exports, subject to compliance with the applicable classification and other requirements. Changes in laws or policies governing the terms of trade, and in particular increased trade restrictions, tariffs or taxes on imports from and exports to Mexico, where we intend to fabricate automotive parts from PyroThin products manufactured in the United States, could have a material adverse effect on our business and financial results.

From time to time we have had difficulty in consistently producing products that meet applicable product specifications and technical and delivery requirements, and such difficulties could expose us to financial, contractual, or other liabilities.

Our insulation products are technologically advanced and require a precise and complex manufacturing process. Because of the precision and complexity of this manufacturing process and the high-performance characteristics of our products, from time to time we have had difficulty in consistently producing products that meet applicable specifications and technical and delivery requirements, including, our customer and end-user specifications and requirements. In the future we, or our third-party external manufacturing facilities in China, may have difficulty in consistently producing products that meet applicable specifications and technical and deliver requirements. At certain times in the past, the growth in demand for our products has contributed to this difficulty by putting significant pressure on our management, our personnel and our production facilities. See *"Risk Factors — Growth has placed significant demands on our management systems and our infrastructure. If we fail to manage our long-term growth effectively, we may be unable to execute our business plan, address competitive challenges and meet applicable product specifications and technical and delivery requirements."*

Furthermore, we seek to lower our manufacturing costs, while maintaining appropriate performance characteristics, and to improve the per square foot costs of our silica aerogel blankets by optimizing our formulations to reduce material costs. Any failure to meet the specifications for our products as a result of our attempts to optimize our formulations, or otherwise, or technical and delivery requirements could result in the termination of existing customer contracts or purchase orders, the elimination or reduction of future purchase orders, the impairment of customer relationships, and the incurrence of financial, contractual or other liabilities. Products that do not meet these specifications or requirements may also expose us to warranty and product liability claims and associated adverse publicity. Any such termination, reduction, impairment, liability or publicity could result in a broader loss of existing customers and revenues and delay the execution of our business plans, disrupt our operations and could have a material adverse effect on our results of operations and financial condition.

A sustained downturn in the energy industry, due to lower oil and gas prices or reduced energy demand, could decrease demand for some or all of our products and services, which could have a material adverse effect on our business, financial condition and results of operations.

Demand for a significant portion of our products and services in the energy industrial and sustainable insulation materials industry depends on the level of capital expenditure by companies in the energy industry, which depends, in part, on current and expected energy prices. Prices of oil and gas have been highly volatile in the past several years with oil prices reaching a high above \$100 per barrel in mid-2014 to a low below \$12 per barrel in early 2020, and in 2022, climbing to over \$90 per barrel. The volatility in oil prices and declines in oil prices, which are often associated with unrelated world events, such as the tensions between Russia and Ukraine and political instability in Ukraine, as well as the conflict in the Middle East, and other areas in the world, have resulted, from time to time, in a reduction in capital expenditures by many companies in the energy industry, and in particular by end-users of our products involved in the construction and expansion of offshore and onshore oil and gas production facilities. Sustained lower energy prices may also reduce our energy industrial and sustainable insulation materials end-users' need to improve energy savings by using premium-priced insulation products like ours, thus reducing demand for our products and causing downward pressure on the pricing of our products. A sustained downturn in the capital expenditures of our energy industrial and sustainable insulation materials customers, whether due to periods of lower energy prices or a further decrease in the market price of oil and gas or otherwise, and including the perception that such a downturn might occur or continue, may delay capital projects, decrease demand for our products and cause downward pressure on the prices we charge for our products, which, in turn, could have a material adverse effect on our business, financial condition and results of operations. Such downturns, including the perception that they might occur or continue, could have a significant negative impact on the market price of our common stock.

Regulation of greenhouse gas emissions could reduce demand for hydrocarbon products and lead to a sustained downturn in the energy industry, which could decrease demand for our products and have a material adverse effect on our business, financial condition and results of operation.

Due to growing concerns about the risks of climate change, a number of countries are adopting or considering adopting regulations to reduce greenhouse gas emissions. The current U.S. administration has announced a renewed focus on potential legislation and regulations to combat climate change. Any potential greenhouse gas regulations, while potentially helpful in the adoption of EVs, could have the impact of increasing energy costs, reducing the demand for hydrocarbons, decreasing profitability and return on investment in the energy industry, and leading to a sustained downturn in the energy industry. Demand for a significant portion of our products depends on the aggregate level of capital expenditure in the energy industry, which depends, in part, on the expected return on such investments. A sustained period of diminished returns or expected returns on capital deployed in the energy industry as a result of greenhouse gas regulations or otherwise, may delay capital projects, decrease demand for our products and cause downward pressure on the prices we charge for our products, which, in turn, could have a material adverse effect on our business, financial condition, results of operations and the market price of our common stock.

The markets we serve are subject to general economic conditions and cyclical demand, which could harm our business and lead to significant shifts in our results of operations from quarter to quarter that make it difficult to project long-term performance.

Our results of operations have been, and may in the future be, adversely affected by general economic conditions and the cyclical pattern of certain industries in which our customers and end-users operate. Demand for our products and services depends in large part upon the level of capital and maintenance expenditures by many of our customers and end-users, in particular those in the energy, petrochemical, and power generation industries, and firms that design, construct, and operate facilities for these industries.

These customers' expenditures have historically been cyclical in nature and vulnerable to economic downturns. In particular, profitability in the energy industry is highly sensitive to supply and demand cycles and commodity prices, which historically have been volatile; and our customers in this industry historically have tended to delay large capital projects, including expensive maintenance and upgrades, during industry downturns. Delays in customer projects may cause fluctuations in the timing or the amount of revenue earned and our results of operations in a particular period. Prolonged periods of little or no

economic growth could decrease demand for oil and gas, which, in turn, could result in lower demand for our products and a negative impact on our results of operations and cash flows. This risk increases as we seek to increase the project-based revenue as a percentage of the total revenue. In addition, this cyclical demand and potential customer project delays may lead to significant shifts in our results of operations from quarter to quarter and from year to year, which limits our ability to make accurate long-term predictions about our future performance. We estimate that sales to end-user customers in the energy industry accounted for approximately 54% of our 2023 revenues and we expect that they will continue to account for a significant portion of our future revenues.

The market for insulation products incorporating aerogel blankets is relatively undeveloped and our products may never be widely adopted, which would have a material adverse effect on our business.

The market for insulation products utilizing aerogel blankets is relatively undeveloped. Accordingly, our future results of operations will depend in large part on our ability to gain market share of the global energy industrial and sustainable insulation materials markets as well as the EV industry. Our ability to gain market share in these markets is highly dependent on the acceptance of our products by large, well-established end-users, distributors, contractors, and OEMs. The insulation market has historically been slow to adopt new technologies and products. Most insulation types currently in use in the energy industrial and sustainable insulation materials markets were developed over 50 years ago. In addition, there is a tendency of end-users in some of our markets to opt for the lower short-term costs associated with traditional insulation materials. If we fail to educate existing and potential end-users, distributors, contractors, and OEMs of the benefits and value offered by our aerogel products, or if existing users of our products no longer rely on aerogel insulation for their insulation needs, our ability to sell our products and grow our revenue could be limited.

Our business strategy also includes the development of next generation products with the performance characteristics and price points required by markets outside of the energy industrial and sustainable insulation materials markets, including the EV market. These performance and price requirements can be more demanding than those we faced in energy industrial and sustainable insulation materials markets. In the event that we are unable to develop products that meet market needs, we may be unable to penetrate such markets. In addition, the development of innovative product and manufacturing methods requires the dedication of significant human, technical and financial resources, with no certainty of success or recovery of our related investment. As a result, we may be unable to grow our business in markets outside of the energy industrial and sustainable insulation materials markets, which could adversely affect our financial performance.

Because we are often a new supplier offering new types of materials to our end-user customers, we also may face concerns from these end-user customers about our reliability and our ability to produce our products in a volume sufficient to meet their supply and quality control needs. As a result, we may experience a reluctance or unwillingness by existing end-user customers to expand their use of our products and by potential end-user customers to begin using our products. Our products may never reach mass adoption, and changes or advances in technologies could adversely affect the demand for our products.

A failure to increase, or a decrease in, demand for aerogel insulation products caused by lack of end-user, market or distribution channel acceptance, technological challenges or competing technologies and products would result in a lower revenue growth rate or decreased revenue, either of which could have a material adverse effect on our business and our results of operations.

If we do not respond appropriately, the evolution of the automotive industry towards mobility on demand services could adversely affect our business.

There has been an increase in consumer preferences for mobility on demand services, such as car- and ride-sharing, as opposed to automobile ownership, which may result in a long-term reduction in the number of vehicles per capita and in turn result in lower demand for our products in the EV market. These evolving areas have also attracted increased competition from entrants outside the traditional automotive industry. If we do not continue to respond quickly and effectively to this evolutionary process, our results of operations could be adversely impacted.

Declines in the market share or business of our large customers may adversely impact our revenues and profitability.

In the future, we anticipate receiving a large proportion of our revenue in the EV market, particularly from automotive OEM customers. Accordingly, our revenues may be adversely affected by decreases in any of their businesses or market share. For instance, a worldwide semiconductor shortage adversely impacted the automotive industry in 2022, 2021 and 2020, resulting in reduced vehicle production schedules and sales from historical levels. Such events in the future could adversely impact our financial condition, operating results and cash flows and could reduce the value of the awarded business and our revenue targets. Furthermore, because our customers typically have no obligation to purchase a specific quantity of parts, a decline in the production levels of any of our major customers, particularly with respect to EV models for which we become a significant supplier, could reduce our sales and thereby adversely affect our financial condition, operating results and cash flows and could reduce the value of the awarded business and our revenue targets.

Employee strikes and labor-related disruptions involving us or one or more of our automotive OEM customers or suppliers may adversely affect our operations.

Our business is labor-intensive. A strike or other form of significant work disruption by our employees would likely have an adverse effect on our ability to operate our business. A labor dispute involving us or one or more of our automotive OEM customers or suppliers, or that could otherwise affect our operations, could reduce our sales and harm our profitability. A labor dispute involving another supplier to our automotive OEM customers that results in a slowdown or a closure of our automotive OEM customers' assembly plants where our products are included in the assembled parts or vehicles could also adversely affect our business and harm our profitability. In addition, our inability or the inability of any of our automotive OEM customers, our suppliers or our customers' suppliers to negotiate an extension of a collective bargaining agreement upon its expiration could reduce our sales and harm our profitability. Significant increases in labor costs as a result of the renegotiation of collective bargaining agreements could also adversely affect our business and harm our profitability. Recently, labor shortages have persisted throughout the economy and our industry is no different. If we are unable to address any labor shortages or increased labor costs adequately, we may not be able to meet demand for our product, which may impact our results of operations and the value of the awarded business.

Our growth in the EV market is dependent upon consumers' willingness to purchase and use EVs.

Our growth in the EV market is highly dependent upon the purchase and use by consumers of EVs. If the market for EVs does not gain broad market acceptance or develops more slowly than we anticipate, our business, prospects, financial condition, and operating results will be harmed. The market for EVs is relatively new, rapidly evolving, characterized by rapidly changing technologies, price competition, additional competitors, evolving government regulation and industry standards, frequent new vehicle announcements, long development cycles for EVs OEMs, and changing consumer demands and behaviors. Factors that may influence the purchase and use of EVs include:

- perceptions about EV quality, safety (in particular with respect to lithium-ion battery packs), design, performance and cost, especially if adverse events or accidents occur that are linked to the quality or safety of EVs;
- perceptions about vehicle safety in general, in particular safety issues that may be attributed to the use of advanced technology, including vehicle electronics and regenerative braking systems;
- the decline of an EV's range resulting from (i) deterioration over time in the battery's ability to hold a charge or (ii) operation in colder weather;
- concerns about electric grid capacity and reliability, which could derail efforts to promote EVs as a practical solution to vehicles that require gasoline;
- the environmental consciousness of consumers;
- volatility in the cost of oil and gasoline;
- safety concerns around EVs generally and battery systems in particular; and
- access to charging stations, standardization of EVs charging systems and consumers' perceptions about convenience and cost to charge an EV;

The influence of any of the factors described above may cause current or potential customers not to purchase EVs and could impact the widespread consumer adoption of EVs, which would materially adversely affect our business, operating results, financial condition and prospects.

Our products are expensive relative to other insulation products, which could make it more difficult for us to grow our revenue and achieve broader adoption of our aerogel products.

While we believe our products have superior performance attributes and may sometimes have the lowest cost on a fully installed basis or offer life-cycle cost savings, our competitors offer many traditional insulation products that are priced below our products. Our products are expensive relative to alternative insulation products and end-user customers may not value our products' performance attributes sufficiently to pay their premium price. This could make it more difficult for us to grow our revenue and achieve broader adoption of our aerogel products. While we seek to lower our manufacturing costs, while maintaining appropriate performance characteristics, and to improve the per square foot costs of our silica aerogel blankets by optimizing our formulations to reduce material costs, we may not be successful in doing so. In addition, some of the benefits of our products are based on reduced installation time and related labor expense. In regions where labor costs are significantly lower than in the United States and Europe, the cost benefits of reduced installation times may not be adequate to overcome the relatively high price of our products and may make it more difficult for us to grow our revenue in those regions.

The insulation markets we serve are highly competitive. If we are unable to compete successfully, we may not be able to increase or maintain our market share and revenues.

We face strong competition primarily from established manufacturers of traditional insulation materials. Large producers of traditional insulation materials, such as Johns Mansville, Saint-Gobain, Knauf Gips, Owens Corning and Rockwool, dominate the insulation market. In addition, we face increasing competition from other companies seeking to develop high-performance insulation materials, including aerogel insulation. We are aware of competitors including Armacell International S.A., JIOS Aerogel Pte. Ltd., Beerenberg AS, Guangdong Alison Hi-Tech Co, Ltd, Nano Tech Co, Ltd, IBIDEN Co., Ltd., IBIH Advanced Materials Co., Ltd., Nameite New Materials Technology Co., Ltd., Guizhou Aerospace Wujiang Electro-Mechanical Equipment Co., Ltd., Shenzhen Aerogel Technology Co., Ltd., and other Asia-based companies that manufacture and/or market aerogel insulation products in blanket form. Our competitors could focus their substantial financial resources to develop new or additional competing products or develop products that are more attractive to potential customers than the products that we offer. We expect to face an increasing amount of competition in the aerogel insulation market over the next several years as existing competitors and new entrants seek to develop and market their own aerogel products.

Because some insulation manufacturers are substantially larger and better capitalized than we are, they may have the ability to sell their products at substantially lower costs to a large, existing customer base. Our products are expensive relative to other insulation products and end-user customers may not value our products' superior performance attributes sufficiently to pay their premium price. In addition, from time to time, we may increase the prices for our products and these price increases may not be accepted by our end-user customers and could result in a decreased demand for our products. Similarly, we may make changes to our products in order to respond to customer demand or to improve their performance attributes and these changes may not be accepted by our end-use customers and could result in a decrease in demand for our products. These competitive factors could:

- make it more difficult for us to attract and retain customers;
- cause us to slow the rate of increase of our prices, delay or cancel planned price increases, lower our prices or discount our prices in order to compete; and
- reduce our market share and revenues.

Any of these outcomes could have a material adverse effect on our results of operations, financial condition and cash flows.

Furthermore, we are in the early stages of developing battery materials for lithium-ion battery systems in EVs, using our carbon aerogel technology. Even assuming successful development of such battery materials for the EVs market, we will face substantial competition in commercializing such materials. We will compete with other companies, many of whom are developing, or can be expected to develop, products similar to ours. Some of our competitors have greater name recognition and a larger customer base. These competitors may be able to respond more quickly to new or changing opportunities and customer requirements and may be able to undertake more extensive promotional activities, offer more attractive terms to customers, and adopt more aggressive pricing policies. We will not only compete with providers of other long-term solutions, such as lithium metal anode, but also with other well-engineered silicon rich anode materials provided by well-capitalized startups with longer experience with silicon-based anodes. Thus, competing silicon-rich anode solutions, even if more expensive, may provide better mid-term solutions for increased energy densities before long-term solutions such as lithium metal anodes become viable. We cannot provide any assurance that we will be able to compete effectively with current or future competitors or that the competitive pressures we face will not harm our business, particularly as it relates to the EVs market.

Failure by us to develop, maintain and strengthen strategic relationships with industry leaders to commercialize our products in the EV market may adversely affect our results of operations and our ability to grow our business.

Our business strategy requires us to align the design and performance attributes of our products and technologies to the evolving needs of the market. To facilitate this process, we have sought out partnerships and relationships with industry leaders in order to assist in the development and commercialization of our products. We face competition from other manufacturers of insulation, thermal barriers, battery materials, and similar products in seeking out and entering into such partnerships and relationships with industry leaders in our targeted EV market and we may therefore not be successful in establishing strategic relationships in those markets.

In the EV market, we are seeking to engage with industry leaders to assist in the optimization of our proprietary and patented carbon aerogels to improve the performance and cost of lithium-ion batteries. We entered into an evaluation agreement with SKC Co., Ltd. to explore the potential use of Aspen's silicon-rich carbon aerogel materials in the anode of lithium-ion batteries. We are also exploring silicon materials from various suppliers for use with our solutions. With the support of such third parties, we are seeking to focus our technical development and accelerate the potential commercialization of these carbon aerogel materials in the EV market.

Unlike the other markets for which we have previously developed thermal solutions, the EV market may be more demanding technically, financially, and in other ways. Additionally, the automotive industry may be more risk averse, may have longer product development and testing cycles or otherwise require resources which we cannot muster in a timely manner to develop and market products and solutions. Furthermore, as we develop an anode active material for the EV market, we will be required to rely on industry partners in evaluating our materials in their respective anodes in combination with matching cathodes to produce cost effective and compelling cells for next generation EVs. We may not be able to find the right partners to achieve our objectives or our interest and our partners' interest may not be well aligned.

We will continue to seek to engage with additional battery material and EV manufacturers to realize the full potential of our Aerogel Technology Platform within the EV market. In the event that we are unable to engage with additional industry leaders or to develop products that meet market needs, we may be less able or unable to penetrate that market. As a result, we may lessen or lose our ability to grow our business in the EV market that could adversely affect our business, financial condition and results of operations, including impairing our profitability.

We have entered into and may enter into future agreements that may limit our ability to broadly market our products or could involve future obligations, which could make it more difficult for us to commercialize certain of our products and negatively affect our business and results of operations.

In order to develop and commercialize our products, we may enter into joint development agreements or commercial arrangements. We cannot be certain that any products will be successfully developed under any such agreement or, even if developed, that they will be successfully produced or commercialized. These agreements may contain exclusivity, ownership of intellectual property, and other terms that may limit our ability to commercialize any products or technology developed in connection with such agreements, including in ways that we do not envision at the time of entering into the agreement. In addition, these agreements may not obligate either party to make any purchases and may contain technical specifications that must be achieved to the satisfaction of our partner, which we cannot be certain we will be able to achieve. If our ability to commercialize products or technology developed in connection with these agreements is limited or if we fail to achieve the technical specifications that may be required, then our business, financial condition, and results of operations could be materially adversely affected.

We may not be able to successfully develop and introduce new products in a timely manner at competitive prices, which would limit our ability to grow and maintain our competitive position and could adversely affect our financial conditions, results of operations and cash flow.

Our growth depends, primarily, on continued increase in the sales of existing products, including by improving the performance of existing products, as well as the successful development and introduction of new products, including new products for applications within the EV market, which face the uncertainty of customer acceptance and reaction from competitors. New product development requires considerable resources and attention that may shift our focus from and may disrupt our current operations, given that we have fewer resources than many of our competitors. We may not be able to sustainably manufacture new products with attractive margins and we may experience higher production inefficiencies than expected. Any delay in the development or launch of a new product could result in our not being the first to market, which could compromise our competitive position. Even if we manage to develop and introduce new products, such products may not address market needs or otherwise compete with third-party products. Even if our new products are adopted by the market, we may not achieve the growth in revenue that we expect from such new products and our investment in these efforts may not be proportional to our expected or actual revenue growth. If we are unable to develop and introduce new products in a cost-effective manner or otherwise manage effectively the operations related to new products, our results of operations and financial condition could be adversely impacted.

If we do not continue to develop and maintain distribution channels for our products and to meet our customers' demand for our products, our results of operations could be adversely affected.

For a significant portion of our revenues, we rely on sales to distributors who then sell our products to end-users in our target markets. Our success depends, in part, on our maintaining satisfactory relationships with these distributors and developing new relationships in new geographies. Our distributors require us to meet expectations of delivery, quality, and pricing of our products, at both the distribution channel level and at the level of the end-user of our products. If we fail to meet expected standards, our revenues would decline and this could materially adversely affect our business, results of operations, and financial condition. In addition, we have been unable at times to produce sufficient amounts of our products to meet demand from our distributors and customers and we may not be able to avoid capacity constraints in the future if demand exceeds our expectations or we fail to expand our capacity in our planned second manufacturing facility in Bulloch County, Georgia, in a timely manner. If we are unable to deliver our products within such short timeframes, we may be at risk of losing direct or end-user customers. Accordingly, shortfalls in sales could materially adversely affect our business and results of operations.

The qualification process for our products can be lengthy and unpredictable, potentially delaying adoption of our products and causing us to incur significant expense potentially without recovery.

Qualification of our products by many of our direct and end-user customers can be lengthy and unpredictable and many of these direct and end-user customers have extended budgeting and procurement processes. This extended sales process requires the dedication of significant time by our personnel and our use of significant financial resources, with no certainty of success or recovery of our related expenses. Furthermore, even after an extensive qualification process, our products may fail to meet the standards sought by our end-user customers and may not be qualified for use by such end-user customers. Additionally, our continued process improvements and cost-reduction efforts may require us or the end-users to re-qualify our products. Failure to qualify or re-qualify our products may result in us losing such companies as end-users of our products, which would cause a decrease in our revenue or revenue growth rate, either of which could materially adversely affect our business and results of operations.

Our revenue may fluctuate, which may result in a high degree of variability in our results of operations and make it difficult for us to plan based on our future outlook and to forecast our future performance.

Our revenue may fluctuate from period to period due to a wide variety of factors. Since we rely on sales to a limited number of direct customers/distributors and end-user customers, changes in demand from one or more direct customers or end-users can significantly impact our revenue from period to period. In addition, the sales cycles for our products, including their qualification for use, are long and can result in unpredictability in our revenues. We expect to have an increasing percentage of our products sold for use in capital projects in the energy industrial market, which orders tend to be larger and more sporadic. This will further increase this unpredictability and the difficulty for us in forecasting quarterly or annual performance. Because of these factors, we have a limited basis on which to predict our quarterly revenue. Our profitability from period-to-period may also vary due to the mix of products that we sell in different periods. These factors may result in a high degree of variability in our results of operations and will make it difficult for us to accurately evaluate and forecast quarterly or annual performance and to plan based on our future outlook.

The results of our operations could be materially adversely affected if our operating expenses incurred do not correspond with the timing of our revenues.

Most of our operating expenses, such as manufacturing facility expenses, employee compensation and research expenses, are either relatively fixed in the short-term or incurred in advance of sales. In addition, our spending levels are based in part on our expectations regarding future revenues. As a result, if revenues for a particular quarter are below expectations, we may not be able to proportionately reduce operating expenses for that quarter. Our reliance on sales to a limited number of direct customers, distributors and end-user customers, the length of our sales cycles and the potentially increasing percentage of our products sold for use in capital projects each can cause sporadic demand for our products that would limit our ability to predict future sales. This limitation could result in our being unable to reduce spending quickly enough to compensate for reductions in sales and could therefore adversely affect our results of operations for any particular operating period. Additionally, as we pursue rapidly evolving opportunities in the EV market, we have been hiring and will continue to hire additional personnel and incur additional expenses as we seek to implement and increase our capabilities and production capacity. The costs associated with these measures are being and will continue to be incurred in advance of our anticipated revenue opportunities, which will negatively impact our results of operations and profitability in the near term.

If we lose key personnel upon whom we are dependent, or if we are unable to successfully recruit and retain skilled employees, we may not be able to manage our operations and meet our strategic objectives.

Our continued success depends to a considerable degree upon the continued services of a small number of our employees with critical knowledge of our products, our manufacturing process, our intellectual property, our customers, and our global operations. The loss or unavailability of any of these individuals could harm our ability to execute our business plan, maintain important business relationships, and complete certain product development initiatives, which could harm our business. In the event that any of these key individuals leave their employment with us or take new employment with a competitor, our business and results of operations could be materially adversely affected. In addition, our continued success depends upon the availability, contributions, vision, skills, experience, and effort of our senior management, financial, sales and marketing, engineering, and production teams and our ability to recruit additional experienced personnel, particularly as we pursue growth opportunities in the EV market. We do not maintain “key person” insurance on any of our employees. We have entered into employment agreements with certain members of our senior management team, but none of these agreements guarantee the services of the individual for a specified period of time. All of the agreements with members of our senior management team provide that employment is at-will and may be terminated by the employee at any time and without notice.

The loss of the services of any of key employees or our inability to recruit and retain qualified personnel or advisors might impede our operations or the

achievement of our strategic and financial objectives. The loss or interruption of the service of any of these individuals or our inability to attract or retain other qualified personnel or advisors could have a material adverse effect on our business, financial condition, and results of operations and could significantly reduce our ability to manage our operations and implement our strategy.

We are exposed to the credit risk of some of our direct customers, including distributors, contractors and OEMs, which subjects us to the risk of non-payment for our products.

We distribute our products, in part, through a network of distributors, contractors and OEMs, some of which may not be well capitalized and may be of a lower credit quality. This direct customer network subjects us to the risk of non-payment for our products. In addition, we operate in a number of countries characterized by intermittent governmental, market and financial crises. In addition, during periods of economic downturn in the global economy, our exposure to credit risks from our direct customers may increase, and our efforts to monitor and mitigate the associated risks may not be effective. In the event of additional non-payments by one or more of our direct customers, our business, financial condition and results of operations could be materially adversely affected.

If we fail to achieve the increase in production capacity that our long-term growth requires in a timely manner, or at all, our growth may be hindered and our business or results of operations may be materially adversely affected.

If, for any reason, including our inability to obtain financing, our planned expansion of capacity in a second plant in Bulloch County, Georgia or the construction of an automated fabrication facility in Mexico should fail to be completed in a timely manner, or at all, or any of the production lines in our existing or future manufacturing facilities do not operate according to our expectations, sales and or profitability may be impeded, our growth may be hindered and our business or results of operations may be materially adversely affected.

Factors that could delay, impede or prevent the construction and operation of future, potential manufacturing facilities include:

- our inability to obtain financing on favorable terms, or at all;
- design, engineering and construction difficulties or delays;
- our failure or delay in obtaining necessary legal, regulatory and other approvals and permits;
- interruptions in the supply of the necessary equipment, or construction materials or labor or an increase in their respective prices;
- opposition of local interests; and
- natural disasters, accidents, political unrest or unforeseen events, man-made or otherwise.

Many factors could prevent our existing and future potential manufacturing facilities from producing at expected, projected or targeted nameplate capacities or could cause us to reduce the scale or scope of future capacity expansions or facilities, including:

- inability to retain, manage and train a skilled workforce;
- the challenges of operating technically advanced or higher volume equipment than currently employed at our existing facility in East Providence, Rhode Island;
- improper operation of the manufacturing equipment;
- decreases in our manufacturing yields due to the inefficient use of the materials needed to make our products in our manufacturing process;
- the availability of raw materials at reasonable costs to support the levels of production that we anticipate at these facilities;
- strikes or labor disputes; and
- damage to the manufacturing equipment due to design and engineering flaws, construction difficulties or operator error.

If we are unable to complete the projects as contemplated, the costs incurred in connection with such projects may not be recoverable. For example, during 2018, we determined that our engineering plans, designs and drawings for a second manufacturing facility in Bulloch County, Georgia, would not be used due principally to our decision to significantly delay construction of the facility and intervening technical developments. Accordingly, we recorded an impairment charge of \$7.4 million in 2018 on pre-construction and related costs for the Georgia facility.

Furthermore, manufacturing of our silicon-rich carbon aerogel anode materials at the required scale and at a competitive cost may be challenging. Our

silicon-rich anode materials are designed to replace graphite partially or completely in current graphitic anodes. Graphite prices are at least an order of magnitude lower than projected cost of our silicon-rich materials. In order to participate in the silicon-rich anode market with any meaningful market share, we need to rapidly scale up our processes to make hundreds of tons per year. Though we have had prior experience successfully scaling up silica-based aerogels, carbon aerogels and silicon-carbon composite aerogels may present their own unique technical and supply chain challenges that may be difficult to overcome in short order, which may adversely impact our business.

If the expected growth in the demand for our products does not follow after each of our planned capacity expansions, then our business will be materially adversely affected.

Our long-term growth plan requires that we continue to increase our production capacity. As we pursue our capacity expansion plans, we will incur significant capital expenditures and increased levels of manufacturing expenses in anticipation of expected growth in demand for our products. In particular, we expect that these substantial additional expenditures will be made by us significantly in advance of the existence of the level of demand that would ensure the most efficient use of our planned new capacity. As a result, if the expected growth in demand for our products fails to materialize within a reasonable amount of time following each of our planned capacity expansions, whether because of low oil and gas prices, the failure of our automotive OEM customers to place firm orders at levels anticipated based on our awarded business expectations, the loss of a significant customer, our inability to grow our sales of EV products, the failure to develop new markets or for any other reason, then we would suffer decreased levels of cash flow and our financial condition and results of operations would be adversely affected.

Growth has placed significant demands on our management systems and our infrastructure. If we fail to manage our long-term growth effectively, we may be unable to execute our business plan, address competitive challenges and meet applicable product specifications and technical and delivery requirements.

We may be unable to manage our growth. To manage our anticipated future growth, we must continue to:

- improve and expand our manufacturing, sales and marketing, and engineering organizations;
- enhance our research and development capabilities and resources;
- improve regulatory compliance, financial control and reporting systems;
- expand our manufacturing, fabrication and distribution facilities and capacity; and
- recruit, train and retain additional qualified personnel to enhance our managerial capabilities.

All of these measures will require significant expenditures and will demand the attention of management. At certain points in the past, significant growth in demand for our products has put our management and operating systems under strain. In addition, the costs associated with and the resources necessary for our capacity expansion plans could exceed our expectations and result in a materially adverse impact on our business, results of operations, financial condition, and cash flows. Furthermore, we compete for personnel and advisors with other companies and other organizations, many of which are larger and have greater name recognition and financial and other resources than we do. Due to our limited resources, we may not be able to effectively manage the expansion of our operations or adequately recruit, train, and retain qualified personnel. Any inability to manage growth could result in a loss of existing customers and revenues, delays in the execution of our business plans, and disruption of our operations. If we fail to achieve the necessary level of efficiency in our organization as it grows, it could have a material adverse impact on our business, results of operations and financial conditions.

We allocate our manufacturing operations, sales and marketing, research and development, general and administrative and financial resources based on our business plan, which includes assumptions about current and future orders and revenues from customers. However, the factors involved in such projections are uncertain. If our assumptions regarding these factors prove to be incorrect or if competing products gain further market share, then actual demand for our aerogel products could be significantly less than the demand we anticipate and we may not be able to grow our revenue or achieve profitability.

A substantial portion of our revenue comes from sales in foreign countries, and we are planning to expand our operations outside of the United States, which subjects us to increased economic, trade, foreign exchange, operational, and political risks that could materially adversely impact our business, financial conditions and results of operations and also increase our costs and make it difficult for us to operate profitably.

A substantial portion of our sales are to destinations outside of the United States, including France, Norway, Thailand, Canada, Germany, Taiwan, Great Britain, Colombia, and South Korea. Total revenue generated from outside of the United States, based on our shipment destination, amounted to \$87.7 million or

37% of total revenue, \$66.4 million or 37% of total revenue and \$54.8 million or 45% of total revenue, for the years ended December 31, 2023, 2022 and 2021, respectively. In addition, we began operating an automated fabrication facility in Mexico and commenced operations during 2022.

As a result, we are subject to a number of risks, including, but not limited to:

- the effect of applicable U.S. and foreign tax structures, including tax rates that may be higher than tax rates in the United States or taxes that may be duplicative of those imposed in the United States;
- trade relations among the United States and those foreign countries in which our customers and suppliers have operations, including protectionist measures such as tariffs and import or export licensing requirements, whether imposed by the United States or such foreign countries, in particular the strained trade relations between the United States and China since 2018;
- general economic and political conditions in each country, which may interfere with, among other things, our supply chain, our customers and all of our activities in a particular location;
- difficulty in the enforcement of contractual obligations in non-U.S. jurisdictions and the collection of accounts receivable from foreign accounts;
- different regulatory regimes in the various countries in which we operate or sell our products;
- inadequate intellectual property protection in foreign countries;
- the difficulties and increased expense in complying with multiple and potentially conflicting domestic and foreign laws, regulations, product approvals and trade standards, including the U.S. Foreign Corrupt Practices Act, or FCPA, and similar anti-bribery laws in non-U.S. jurisdictions, as well as the rules and regulations of the U.S. Department of Treasury's Office of Foreign Assets Control, or OFAC, and similar sanctions laws;
- foreign currency exchange controls, restrictions and fluctuations, which could result in reduced revenue and increased operating expense;
- transportation delays or interruptions;
- labor rules and collective bargaining arrangements in foreign jurisdictions;
- difficulty in staffing and managing (including ensuring compliance with internal policies and controls) geographically widespread operations; and
- armed conflicts, terrorist activity, and political unrest, particularly given the use of our products at energy facilities.

Additionally, we have generated revenue from LNG projects located in Russia in recent years. The current Russian-Ukrainian conflict and the emerging response from western nations, including sanctions, may have an adverse effect on our revenue and results of operations.

In addition, sales of our products are generally conducted in U.S. dollars, and we also bid for foreign projects in U.S. dollars. The strengthening of the U.S. dollar against the local currencies in the countries into which we sell our products may result in our products becoming more expensive relative to competing insulation products priced in local currencies. If the U.S. dollar strengthens, our sales into foreign countries with relatively weaker currencies may be adversely impacted, and we may be less competitive in bidding for projects in those markets.

Our success will depend in large part on our ability to manage the effects of continued global political and economic uncertainty, including those related to the ongoing recent tensions between Russia and Ukraine, the conflict in the Middle East, and political instability in Ukraine, especially in our international markets.

Because of our significant international operations, we could be materially adversely affected by violations of the U.S. FCPA and similar anti-corruption, anti-bribery, and anti-kickback laws.

We operate on a global basis, with 37% of our product sales in 2023 made to destinations outside of the United States, including Canada, Mexico, Europe, United Kingdom, Asia, South America, and the Middle East. Our business operations and sales in countries outside of the United States are subject to anti-corruption, anti-bribery and anti-kickback laws and regulations, including restrictions imposed by the FCPA, as well as the United Kingdom Bribery Act of 2010, or UK Bribery Act. The FCPA, UK Bribery Act, and similar anti-corruption, anti-bribery and anti-kickback laws in other jurisdictions generally prohibit companies, their intermediaries and their agents from making improper payments to government officials or any other persons for the purpose of obtaining or

retaining business. We operate and sell our products in many parts of the world that have experienced governmental corruption to some degree and, in certain circumstances, strict compliance with anti-corruption, anti-bribery and anti-kickback laws may conflict with local customs and practices. We train our employees concerning anti-corruption, anti-bribery, and anti-kickback laws and have policies in place that prohibit employees from making improper payments. We continue to implement internal controls and procedures designed to ensure that we comply with anti-corruption, anti-bribery, and anti-kickback laws, rules and regulations and mitigate and protect against corruption risks. We cannot provide assurance that our internal controls and procedures will protect us from reckless, criminal or other acts committed by our employees or third-parties with whom we work. If we are found to be liable for violations of the FCPA or similar anti-corruption, anti-bribery, and anti-kickback laws in international jurisdictions, either due to our own acts or out of inadvertence, or due to the acts or inadvertence of others, we could suffer criminal or civil fines or penalties or other repercussions, including reputational harm, which could have a material adverse effect on our business, results of operations, and financial condition.

A failure to comply with export control or economic sanctions laws and regulations could have a material adverse impact on our business, results of operations or financial condition. We may be unable to ensure that our distributors comply with applicable sanctions and export control laws.

We face several risks inherent in conducting business internationally, including compliance with applicable economic sanctions laws and regulations, such as laws and regulations administered by OFAC, the United States Department of State and the United States Department of Commerce. We must also comply with all applicable export control laws and regulations of the United States and other countries. Violations of these laws or regulations could result in significant additional sanctions including criminal or civil fines or penalties, more onerous compliance requirements, more extensive debarments from export privileges or loss of authorizations needed to conduct aspects of our international business.

In certain countries, we may engage third-party agents or intermediaries, such as customs agents, to act on our behalf. If these third-party agents or intermediaries violate applicable laws, their actions may result in criminal or civil fines or penalties or other sanctions being assessed against us. We take certain measures designed to ensure our compliance with U.S. export and economic sanctions law, and we believe that we have never sold our products to Iran, Cuba, Sudan, or Syria through third-party agents or intermediaries or made any effort to attract business from any of these countries. However, it is possible that some of our products were sold or will be sold to distributors or other parties that, without our knowledge or consent, re-exported or will re-export such products to these countries. Although none of our non-U.S. distributors are located in, or to our knowledge, conduct business with Iran, Cuba, Sudan, or Syria, we may not be successful in ensuring compliance with limitations or restrictions on business with these or other countries subject to economic sanctions. There can be no assurance that we will be in compliance with export control or economic sanctions laws and regulations in the future.

Any such violation could result in significant criminal or civil fines, penalties or other sanctions and repercussions, including reputational harm that could have a material adverse impact on our business, results of operations or financial condition.

We rely on sales to a limited number of direct customers, including distributors, contractors, OEMs, partners and end-user customers for the substantial majority of our revenue, and the loss of one or more significant direct customers or several of our smaller direct customers could materially harm our business. In addition, we understand from our customers that a substantial majority of their sales of our products are to a small number of end-user customers and the loss of one or more significant end-user customers or several of our smaller end-user customers could materially harm our business.

A substantial majority of our revenue is generated from sales to a limited number of direct customers, including distributors, contractors, OEMs, partners and end-user customers. For the years ended December 31, 2023, 2022 and 2021, total revenue from our top ten direct customers represented 80%, 72%, and 68% of our revenues, respectively. General Motors, LLC and Distribution International, Inc. represented 41% and 14% of our total revenue in 2023; General Motors, LLC and Distribution International, Inc. represented 25% and 22% of our total revenue in 2022; and Distribution International, Inc. represented 28% of our total revenue in 2021. Although the composition of our significant distributors, contractors, OEMs, partners and end-user customers will vary from period to period, we expect that most of our revenues will continue, for the foreseeable future, to come from sales to a relatively small number of direct customers. In addition, we understand from our direct customers that a substantial majority of their sales of our products are to a small number of end-user customers.

Our direct customer concentration also creates accounts receivable concentrations and related risks. As of December 31, 2023, General Motors, LLC and Distribution International, Inc. accounted for 60% and 6% of our accounts receivable, respectively.

A substantial amount of our expected sales in the EV market in 2024 are expected to be to a single customer. The substantial majority of our sales to distributors are transacted on a purchase order basis. The contracts we enter into with our direct customers generally do not include long-term commitments or minimum volumes that ensure future sales of our products. In addition, we understand that our direct customers' contracts with end-user customers also

generally do not include such commitments or minimums. Consequently, our results of operations may fluctuate significantly from period-to-period based on the actions of one or more significant direct customers or end-user customers.

A direct customer may take actions that affect us for reasons that we cannot anticipate or control, such as reasons related to an end-user customer's financial condition, contractual arrangements with end-user customers, changes in business strategy or operations, the introduction of alternative competing products, or as the result of the perceived quality or cost-effectiveness of our products. Our agreements with these direct customers may be canceled if we fail to meet certain product specifications or materially breach the agreement or for other reasons outside of our control. In addition, our direct customers may seek to renegotiate the terms of current agreements upon maturity or renewal. The loss of, or a reduction in sales or anticipated sales to, one or more of our significant direct customers or end-user customers or several of our smaller direct customers or end-user customers could have a material adverse effect on our business, financial condition, and results of operations.

If we are unable to maintain our technological advantage over our competitors, our business may be materially adversely affected.

We research, develop, manufacture and sell high-performance aerogel insulation products. Rapid and ongoing changes in technology and product standards could quickly render our products less competitive, or even obsolete, particularly if we fail to continue to improve the performance of our insulation products. We are currently developing new applications for our existing products as well as new aerogel technologies; however, our efforts may not be successful and new applications or technologies may not be commercially useful. Other companies that are seeking to enhance traditional insulation materials have recently introduced or are developing other emerging insulation technologies. These competitors are engaged in significant development work on these various insulation products. Competing technologies that outperform our insulation in one or more performance attributes could be developed and successfully introduced.

We are also aware of certain companies, including Armacell International S.A., Beerenberg AS, JIOS Aerogel Pte. Ltd., IBIDEN Co., Ltd., Guangdong Alison Hi-Tech Co, Ltd., Nano Tech Co, Ltd, IBIH Advanced Materials Co., Ltd., Nameite New Materials Technology Co., Ltd., Guizhou Aerospace Wujiang Electro-Mechanical Equipment Co., Ltd., Shenzhen Aerogel Technology Co., Ltd., and a variety of other companies based in Asia that have developed or are developing and/or marketing products using aerogel technology similar to our technology. These or other companies have developed significant aerogel manufacturing capacity, have introduced or could introduce aerogel products that compete directly with our products and could in the future outperform our products in one or more performance attributes, could be offered to our customers as a cheaper alternative to our products or may result in increased pricing pressure on our products. As a result of increasing competitive activity by other companies in the aerogel insulation market, both now and in the future, we may not be able to sustain our competitive position in our target markets. Any degradation in our competitive position could have a material adverse effect on our business, financial condition and results of operations.

In addition, certain technological advancements may render our products obsolete. In particular, the future direction of EV battery packs may strike a commercially reasonable balance between the need for higher energy densities and the need for better safety outcomes. A rapid progress towards technologies such as solid electrolytes, safer electrode active materials (such as LFP cathodes) may provide a better balance of energy density and safety, render our premium thermal barriers obsolete and have a material adverse effect on our business, financial condition and results of operations.

Negative perceptions regarding the safety, quality or other attributes of our products or a failure or a perceived failure of our products could have a material adverse effect on our results of operations and could make us unable to continue our business.

It is essential to our existing business and to our future growth that our products are considered safe. Even modest perceptions by existing or potential distributors, contractors or end-user customers in our target markets that our products are not safe could have a critical impact on our ability to sell our products and to continue as a business. Further, our competitors have in the past, and may in the future, seek to create or perpetuate such perceptions. There is risk of an actual or perceived failure of our products or other negative perceptions regarding our products, such as perceived health hazards. For example, dust is produced by our products during their installation and use, which increases the likelihood of the perception of a hazard. Another example is the potential in very high temperature applications for material failure. Like most insulation products, our Pyrogel XT and XTE products will normally go through a controlled burn-in process immediately after exposure to high temperatures. If installed improperly, the burn-in may proceed too rapidly and the material may become damaged. In addition, the thermal performance of our materials may degrade over time due to a variety of operational or environmental conditions. We take steps to educate our distributors, contractors, OEMs and end-user customers on the nature of our products and the proper installation and operating procedures in order to mitigate these risks. Such an event, or the perception of such an event, could quickly result in our direct and end-user customers replacing our products with traditional insulation materials which could have a material adverse effect on our results of operations.

Our activities and operations are subject to numerous health and safety laws and regulations. If we violate such regulations, we could face penalties and fines or be required to curtail or cease operations.

We are subject to numerous health and safety laws and regulations in each of the jurisdictions in which we operate. These health and safety laws and regulations apply to us including with regard to hazardous substances that we use in our manufacturing process and that certain of our products contain. These substances include titanium dioxide, ethanol, methanol and ammonia, each of which has been determined, in certain forms, with certain contaminants and at certain levels, to be hazardous, possibly carcinogenic, or otherwise harmful to humans. We may also consider and adopt the use of other hazardous substances or substances potentially containing hazardous contaminants, with similar or higher risks in connection with new products or modifications to our current products and related manufacturing.

Our processes also require the use of other regulated substances in raw material delivery and manufacturing, including among others, ethanol. Applicable laws and regulations require us to obtain and maintain permits and approvals and implement health and safety programs and procedures to control risks associated with our operations. Compliance with those laws and regulations can require us to incur substantial costs. Moreover, if our compliance programs are not successful, we could be subject to penalties or to revocation of our permits, which may require us to curtail or cease operations of the affected facilities. In particular, the construction of future, potential facilities will require us to obtain and maintain new permits from various regulatory authorities and if the issuance of such permits is delayed or denied, it would slow or potentially prevent the expansion of our manufacturing capacity. Violations of laws, regulations and permit requirements may also result in criminal sanctions, injunctions and the denial or revocation of our various permits.

While we use hazardous substances, including titanium dioxide, carbon black, and similar chemicals, in forms and at levels that are subject to current rules and regulations, such rules and regulations may become more stringent such that we are required to modify our manufacturing process and such that our customers' use of our products may be impacted. Regulatory changes contemplated in several regions may substantially increase these risks. Changes in the products or manufacturing processes may require the customers to perform an extensive re-qualification process, which our customers may not want to undertake for various reasons, resulting in the customer switching to competing products. In addition, changes in our production or manufacturing process may result in uses above currently permitted levels. Such uses or changes in rules or regulations could materially adversely affect our business, financial condition, and results of operations.

Health and safety laws, regulations and permit requirements may become more stringent or otherwise change. Any such changes could require us to incur materially higher costs than at present. Our costs of complying with current and future health and safety laws, regulations and permit requirements, and any liabilities, fines or other sanctions resulting from violations of them, could adversely affect our business, financial condition, and results of operations.

We may face certain product liability or warranty claims on our products, including from improper installation of our products by third parties. As a consequence, we could lose existing and future business and our ability to develop, market and sell our insulation could be harmed.

The design, development, production and sale of our products involve an inherent risk of product liability claims and associated adverse publicity. We seek to lower our manufacturing costs, while maintaining appropriate performance characteristics, and to improve the per square foot costs of our silica aerogel blankets by optimizing our formulations to reduce material costs. If our products do not function as represented as a result of such changes in formulations, we may face warranty claims on our products. In addition, we may be named directly in product liability suits relating to our products, even for defects resulting from errors of our distributors, contractors, OEMs, partners, or end-user customers. These claims could be brought by various parties, including distributors, contractors, OEMs, partners, and other direct end-user customers who are purchasing products directly from us, or end-user customers who purchase our products from our distributors. We could also be named as co-parties in product liability suits that are brought against the distributors, contractors, OEMs, partners, and end-user customers. Our products are often installed in our end-user customers' complex and capital-intensive facilities in inherently hazardous or dangerous environments, including in the energy, petrochemical, and power generation industries, where the potential liability from risk of loss could be substantial. The failure of our products to perform to customer expectations, whether or not because of improper installation, could give rise to warranty claims against us. We take steps to educate our distributors, contractors, OEMs, partners, and end-user customers about the proper installation procedures to mitigate the risk of an uncontrolled burn-in for very high temperature applications of Pyrogel XT and XTE. However, installation of our products is handled by third parties over whom we have no control and errors or defects in their installation may also give rise to claims against us, diminish our brand, or divert our resources from other purposes. Any of these claims, even if without merit, could result in costly litigation or divert management's attention and resources. In addition, many of our products are integrated into the final products of our customers. The integration of our products may entail the risk of product liability or warranty claims based on malfunctions or hazards from both our products and the final products of our customers.

A material product liability claim may seriously harm our results of operations, as well as damage our customer relationships and reputation. Although we carry general liability insurance, our current insurance coverage could be insufficient to protect us from all liability that may be imposed under these types of claims. In addition, our distributors, contractors, OEMs, partners, and end-user customers may not have adequate insurance to cover against potential claims. If claims or losses exceed our liability insurance coverage, we may go out of business. In addition, insurance coverage is expensive, may be difficult to obtain and may not be available in the future on acceptable terms or at all. A significant increase in the cost of insurance coverage could adversely affect our business, financial condition and results of operations.

Furthermore, if any of our products are or are alleged to be defective, particularly the products that we sell to our OEM customers, we may be required to participate in a recall involving such products. Each automotive manufacturer has its own practices regarding product recalls and other product liability actions relating to its suppliers. However, as suppliers become more integrally involved in the vehicle design process and assume more of the vehicle assembly functions, OEMs continue to look to their suppliers for contribution when faced with recalls and product liability claims. OEMs also require their suppliers to guarantee or warrant their products and bear the costs of repair and replacement of such products under new vehicle warranties. Depending on the terms under which we supply products to an automotive OEM, an automotive OEM may attempt to hold us responsible for some or all of the repair or replacement costs of products under new vehicle warranties when the OEM asserts that the product supplied did not perform as warranted.

In addition, as we adopt new technology, we face an inherent risk of exposure to the claims of others that we have allegedly violated their intellectual property rights. We cannot ensure that we will not experience any material warranty, product liability or intellectual property claim losses in the future or that we will not incur significant costs to defend such claims.

We may incur significant costs complying with environmental, health and safety laws, and related claims, and failure to comply with these laws and regulations could expose us to significant liabilities, which could materially adversely affect our results of operations.

Costs of compliance with regional, national, state, and local existing and future environmental, health and safety laws, and regulations could adversely affect our cash flow and results of operations. We are required to comply with numerous environmental laws and regulations and to obtain numerous governmental permits in order to operate our facilities and in connection with the design, development, manufacture, and transport of our products and the storage, use, handling, and disposal of hazardous substances, including environmental, health and safety laws, regulations and permits governing air emissions or water usage and disposal. We may incur significant additional costs to comply with these requirements, which are becoming stringent in a progressive manner. If we fail to comply with these current and new requirements, we could be subject to civil or criminal liability, damages and fines, require substantial capital investment to remedy non-compliance, and our operations could be curtailed, suspended, or shutdown. In addition, certain foreign laws and regulations may affect our ability to export products outside of the United States. Existing environmental, health and safety laws, and regulations could be revised or reinterpreted and new laws and regulations could be adopted or become applicable to us or our products, and future changes in environmental, health and safety laws, and regulations could occur. These factors may materially increase the amount we must invest to bring our processes into compliance and impose additional expense on our operations.

Among the changes to environmental laws and regulations that could occur is the adoption of regulatory frameworks to reduce greenhouse gas emissions, which a number of countries, particularly in the European Union, have adopted, or are considering adopting, including the 2015 Paris Agreement on Climate Change. These include adoption of cap and trade regimes, carbon taxes, restrictive permitting, increased efficiency standards, and incentives or mandates for renewable energy, any of which could increase the costs of manufacturing our products and increase our compliance costs, and/or reduce demand for our products from our customers in the energy industry, all of which could materially adversely affect our business and results of operations.

In addition, private lawsuits, including claims for remediation of contamination, personal injury or property damage, or actions by regional, national, state and local regulatory agencies, including enforcement or cost-recovery actions, may materially increase our costs. Certain environmental laws make us potentially liable on a joint and several basis for the remediation of contamination at or emanating from properties or facilities that we currently or formerly owned or operated or properties to which we arranged for the disposal of hazardous substances. Such liability may require us to pay more than our fair share and could require us to address contamination caused by others. For example, the site of our East Providence facility contains certain levels of contamination caused by prior third-party activities on and near the site. Such contamination remains in place under a state-approved deed restriction, and we are required to comply with such deed restriction and the accompanying soil management plan. In general, the deed restriction prohibits the residential use of the property and the use of groundwater as potable water, and requires the maintenance of engineering controls and annual inspections to help prevent exposure to contaminated soils. The soil management plan requires us to notify the state environmental agency with respect to any soil excavation, stockpiling, sampling, and off-site disposal of excavated soil. Although we have not had to make material expenditures to satisfy these requirements to date, in the future, we may incur additional

costs to comply with these requirements and failure to do so could disrupt the operation of our facility or could subject us to liability for environmental remediation. We may incur liability relating to the remediation of contamination, including contamination we did not cause. Furthermore, ethanol, one of the materials that we handle in large quantities in our manufacturing process is subject to additional laws and regulations including those administered by the U.S. Alcohol and Tobacco Tax and Trade Bureau. While we seek to comply with the stringent requirements of these laws and regulations, these laws and regulations are complex and are subject to interpretation. Any changes in these laws or regulations or any interpretation thereof, or changes in our manufacturing processes may require us to request changes to our existing permits or obtain new permits. Any requests to change our existing permits or obtain new permits may be delayed or denied and may require us to modify our manufacturing processes, which could be costly and time consuming and could adversely affect our business and results of operations.

We may not be able to obtain or maintain, from time to time, all required environmental regulatory approvals. A delay in obtaining any required environmental regulatory approvals or failure to obtain and comply with them could materially adversely affect our business and results of operations.

Breakdowns, security breaches, loss of data, and other disruptions of our information technology systems could compromise sensitive information related to our business, prevent us from accessing critical information, and expose us to liability, which would cause our business and reputation to suffer.

In the ordinary course of our business, we collect and store sensitive data, including intellectual property, our proprietary business information and that of our suppliers, customers and business partners, and personally identifiable information about our employees and business contacts. We manage and maintain our applications and data utilizing on-site and off-site systems. These applications and data encompass a wide variety of business-critical information including research and development information, commercial information, and business and financial information. We face four primary risks relative to protecting this critical information: loss of access; inappropriate or unauthorized disclosure; inappropriate or unauthorized modification; and inadequate monitoring of our controls over the first three risks.

The secure processing, storage, maintenance, and transmission of this critical information is vital to our operations and business strategy, and we devote resources to protecting such information. Although we take measures to protect sensitive information from unauthorized access or disclosure, our information technology and infrastructure may be vulnerable to breakdowns, attacks by hackers, viruses, breaches or interruptions due to employee error, malfeasance or other disruptions, faulty password management or lapses in compliance with privacy and security mandates. Any such virus, breakdown, attack, breach, or interruption could compromise our networks and the information stored there could be accessed by unauthorized parties, publicly disclosed, lost, or stolen. Third parties may attempt to fraudulently induce employees or other persons into disclosing usernames, passwords or other sensitive information, which may in turn be used to access our information systems, commit identity theft or carry out other unauthorized or illegal activities. Any such breach could compromise our networks and the information stored there could be accessed, publicly disclosed, lost or stolen. We engage third-party vendors and service providers to store and otherwise process some of our data, including sensitive and personal information. Our vendors and service providers may also be the targets of the risks described above, including cyberattacks, ransomware, malicious software, phishing schemes, and fraud. From time to time, we get notifications that such vendors experienced cyber security breaches. Our ability to monitor our vendors and service providers' data security is limited, and, in any event, third parties may be able to circumvent those security measures, resulting in the unauthorized access to, misuse, disclosure, loss or destruction of our data, including sensitive and personal information, and disruption of our or third-party service providers' systems. We and our third-party service providers may face difficulties in identifying, or promptly responding to, potential security breaches and other instances of unauthorized access to, or disclosure or other loss of, information. Any hacking or other attack on our or our third-party service providers' or vendors' systems, and any unauthorized access to, or disclosure or other loss of, information suffered by us or our third-party service providers or vendors, or the perception that any of these have occurred, could result in legal claims or proceedings, loss of intellectual property, liability under laws that protect the privacy of personal information, negative publicity, disruption of our operations and damage to our reputation, which could divert our management's attention from the operation of our business and materially and adversely affect our business, revenues and competitive position. Moreover, we may need to increase our efforts to train our personnel to detect and defend against cyber- or phishing-attacks, which are becoming more sophisticated and frequent, and we may need to implement additional protective measures to reduce the risk of potential security breaches, which could cause us to incur significant expenses. Recently, Russian ransomware gangs have threatened to increase hacking activity against critical infrastructure of any nation or organization that retaliates against Moscow for its invasion of Ukraine. Any such increase in such attacks on our third-party provider or other systems could adversely affect our network systems or other operations. We have measures in place that are designed to detect and respond to such security incidents and breaches of privacy and security mandates, but there can be no assurance that our efforts will prevent or detect such breakdowns or breaches in our systems, if at all.

Any such security breach or interruption, as well as any action by us or our employees or contractors that might be inconsistent with the rapidly

evolving data privacy and security laws and regulations applicable within the United States and elsewhere where we conduct business, could result in enforcement actions by U.S. states, the U.S. federal government or foreign governments, liability or sanctions under data privacy laws that protect personally identifiable information, regulatory penalties, other legal proceedings such as but not limited to private litigation, the incurrence of significant remediation costs, disruptions to our development programs, business operations and collaborations, diversion of management efforts and damage to our reputation, which could harm our business and operations. Because of the rapidly moving nature of technology and the increasing sophistication of cybersecurity threats, our measures to prevent, respond to and minimize such risks may be unsuccessful.

In addition, our insurance may be insufficient to cover our losses resulting from cyber-attacks (including ransomware), breaches, or other interruptions, and any incidents may result in loss of, or increased costs of, such insurance. The successful assertion of one or more large claims against us that exceed available insurance coverage, the occurrence of changes in our insurance policies, including premium increases or the imposition of large deductible or co-insurance requirements, or denials of coverage, could have a material adverse effect on our business, including our financial condition, results of operations and reputation.

Our contracts with U.S. government agencies may subject us to audits, criminal penalties, sanctions, and other expenses and fines.

We perform contract research services for U.S. government agencies and our products are sold to customers that may incorporate them into government projects. U.S. government agencies, including the Defense Contract Audit Agency and the Department of Labor, routinely audit government contractors. These agencies review a contractor's compliance with contract terms and conditions, performance under its contracts, cost structure and compliance with applicable laws, regulations and standards. The U.S. government also may review the adequacy of a contractor's systems and policies, including a contractor's purchasing, property, estimating, billing, accounting, compensation and management information systems. Any costs found to be overcharged or improperly allocated to a specific contract or any amounts improperly billed or charged for products or services will be subject to reimbursement to the government. As a government contractor, we are required to disclose to the U.S. government credible evidence of certain violations of law and contract overpayments. If we are found to have participated in improper or illegal activities, we may be subject to civil and criminal penalties and administrative sanctions, including termination of contracts, forfeiture of profits, suspension of payments, fines and suspension or prohibition from doing business with the U.S. government. Any negative publicity related to such contracts, regardless of the accuracy of such publicity, may adversely affect our business or reputation.

Our ability to use our net operating loss carryforwards may be subject to limitation, which could result in a higher effective tax rate and adversely affect our financial condition and results of operations.

During 2014, we performed analyses pursuant to Section 382 of the Internal Revenue Code of 1986, as amended, or the Internal Revenue Code, as well as similar state provisions, in order to determine whether any limitations might exist on the utilization of net operating losses and other tax attributes. Generally, a change of more than 50% in the ownership of a company's stock, by value, over a three-year period constitutes an ownership change for U.S. federal income tax purposes. An ownership change may limit a company's ability to use its net operating loss carryforwards attributable to the period prior to such change. Based on these analyses, we determined that it is more likely than not that an ownership change occurred on June 18, 2014 upon the closing of our IPO, resulting in an annual limitation on the use of our net operating losses and other tax attributes as of such date. As a result, our prior net operating losses were limited to \$155.2 million, including built-in gains of \$42.0 million at the date of that ownership change. The use of our net operating loss carryforwards may be restricted further in the event of any changes in our ownership.

Trends in adoption of cathode chemistries may adversely affect the adoption of silicon-rich carbon aerogels that we are developing for use in anodes.

Success in adoption of our silicon rich anode materials that we are developing for use in anodes depends on the need for matching cathode chemistries requiring high anode performance. Cathodes typically comprise oxides of metals such as nickel, manganese, aluminum and cobalt. One current trend is towards developing a higher nickel and lower (or no) cobalt-based cathode. Such cathodes require a matching higher performance anode like those manufactured with our silicon-rich carbon aerogel materials. Another trend is to use lower capacity, but safer cathode chemistries such as lithium iron phosphate (LFP). Certain battery manufacturers and automotive OEMs have already brought vehicles to the market with LFP cathodes. While vehicles with LFP cathodes may have lower energy densities leading to lower driving ranges, they are safer and have lower costs. If mass-market adoption of lower performance chemistries such as LFP continues, the demand for higher performing anodes including those containing our silicon-rich carbon aerogel materials will be reduced or limited to higher end vehicles, thus limiting our market participation.

We or the third parties upon which we depend may be adversely affected by general political, unstable market and economic conditions and other events beyond our control and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

We are subject to the risks arising from adverse changes in market and economic and political conditions, both domestically and globally, including trends toward protectionism and nationalism, other unfavorable changes in economic conditions as well as disruptions in global credit and financial markets, such as inflation, failures and instability in U.S. and international banking systems, downgrades of the U.S. credit rating, rising interest rates, slower economic growth or a recession, and other events beyond our control, such as natural disasters, pandemics, epidemics, political instability, and armed conflicts and wars, including the ongoing conflict between Russia and Ukraine, and the conflict in the Middle East. The short and long-term implications of Russia's invasion of Ukraine and the conflict in the Middle East are difficult to predict at this time. We continue to monitor any adverse impact that the outbreak of war in Ukraine and the subsequent institution of sanctions against Russia by the United States and several European and Asian countries may have on the global economy in general, on our business and operations and on the businesses and operations of our suppliers and customers. For example, a prolonged conflict may result in challenges associated with timely receipt of customer payments and banking transactions, increased inflation, escalating energy prices and constrained availability, and thus increasing costs, of raw materials.

Increases in inflation have the potential to adversely affect our liquidity, business, financial condition and results of operations by increasing our overall cost structure. The existence of inflation in the economy has resulted in, and may continue to result in, higher interest rates and capital costs, shipping costs, supply shortages, increased costs of labor, weakening exchange rates and other similar effects. As a result of inflation, we have experienced and may continue to experience, cost increases. Although we may take measures to mitigate the impact of this inflation, if these measures are not effective our business, financial condition, results of operations and liquidity could be materially adversely affected. Even if such measures are effective, there could be a difference between the timing of when these beneficial actions impact our results of operations and when the cost inflation is incurred.

Additionally, increases in inflation, along with the uncertainties surrounding geopolitical developments and global supply chain disruptions, have caused, and may in the future cause, global economic uncertainty and uncertainty about the interest rate environment. A failure to adequately respond to these risks could have a material adverse impact on our financial condition, results of operations or cash flows.

The U.S. debt ceiling and budget deficit concerns have increased the possibility of credit-rating downgrades and economic slowdowns, or a recession in the United States. On August 1, 2023, Fitch Ratings downgraded the United States' long-term foreign currency issuer default rating to AA+ from AAA as a result of these repeated debt ceiling and budget deficit concerns. The impact of this or any further downgrades to the U.S. government's sovereign credit rating or its perceived creditworthiness could adversely affect the U.S. and global financial markets and economic conditions.

If the equity and credit markets deteriorate, it may make any necessary equity or debt financing more difficult to secure, more costly or more dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could harm our growth strategy, financial performance and stock price and could require us to delay or abandon plans with respect to our business. Further, if the financial institutions with which we do business enter receivership or become insolvent in the future, there is no guarantee that the Department of the Treasury, the Federal Reserve and the FDIC will intercede to provide us and other depositors with access to balances in excess of the \$250,000 FDIC insurance limit, that we would be able to access our existing cash, cash equivalents and investments, that we would be able to maintain any required letters of credit or other credit support arrangements, or that we would be able to adequately fund our business for a prolonged period of time or at all, any of which could have a material adverse effect on our business, financial condition and results of operations. We cannot predict the impact that the high market volatility and instability of the banking sector more broadly could have on economic activity and our business in particular. In addition, there is a risk that one or more of our current service providers, external manufacturing facilities or other third parties with which we conduct business may not survive difficult economic times, the ongoing conflict between Russia and Ukraine, the conflict in the Middle East, the instability of the banking sector, and the uncertainty associated with current worldwide economic conditions, which could directly affect our ability to attain our operating goals on schedule and on budget.

The effects of current and future economic and political conditions and other events beyond our control on us, our suppliers, external manufacturing facilities and customers could severely disrupt our operations and have a material adverse effect on our business, results of operations, financial condition and prospects. If a natural disaster, power outage or other event occurred that prevented us from using all or a significant portion of our headquarters, that damaged critical infrastructure, such as our external manufacturing facilities manufacturing facilities, or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible for us to continue our business for a substantial period of time. The disaster recovery and business continuity plans we have in place may prove inadequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which could have a material adverse effect on our business.

Risks Related to Our Intellectual Property

Our inability to protect our intellectual property rights could negatively affect our business and results of operations.

Our ability to compete effectively depends in part upon developing, maintaining and/or protecting intellectual property rights relevant to our aerogel product forms, applications, manufacturing technologies, and brand names. We rely principally on a combination of patent protection, trade secret laws, confidentiality and nondisclosure agreements, trademark registrations, common law rights, and licensing arrangements to establish and protect the intellectual property rights relevant to our business. However, these measures may not be adequate in every given case to permit us to gain or keep any competitive advantage, particularly in those countries where the laws do not protect our proprietary rights as fully as or where the enforcement tools are weaker or less effective than those in the United States. In particular, since aerogels were developed approximately 80 years ago, there has been a wide range of research, development and publication related to aerogels, which makes it difficult to establish intellectual property rights to many key elements of aerogel technology and to obtain patent protection. Accordingly, much of the general technology that we use in our manufacture of aerogel blankets is not protected by patents. As a result, we may be unable to meaningfully protect against third-party products incorporating aerogel blankets or compositions.

Where we consider it appropriate, our strategy is to seek patent protection in the United States and other countries on technologies used in or relating to our aerogel product forms, applications and manufacturing technologies. As of December 31, 2023, we had 75 issued U.S. patents and 358 issued foreign patents. The issuance of a patent is not conclusive as to its scope, validity or enforceability. Thus, any patent held by us or to be issued to us from a pending patent application, could be challenged, invalidated or held unenforceable in litigation or proceedings before the USPTO and/or other patent tribunals in the United States or in foreign jurisdictions. Third parties could develop technologies that circumvent the patent protection we have secured. No consistent policy regarding the breadth of patent claims has emerged to date in the United States and the landscape could become more uncertain in view of future rule changes by the USPTO, the introduction of patent reform legislation and decisions in patent law cases by the federal courts including the United States Supreme Court.

The patent landscape outside of the United States is even less predictable. As a result, the validity and enforceability of patents cannot be predicted with certainty. For example, we are aware of competitors that manufacture and market aerogel insulation products in China, where it may be difficult for us to enforce our intellectual property rights against these or other competitors.

In 2021, we initiated a patent infringement action against AMA S.p.A. and AMA Composites S.r.l. (collectively, AMA) at the Court of Genoa, Italy. In 2023, we initiated patent infringement actions against Beerenberg Services AS and Beerenberg Korea Ltd. at the Seoul District Court and against Beerenberg Korea Ltd., and Bronx (China) Co., Ltd. at the Korea Trade Commission (KTC). Further details of these actions are set forth in this filing, as well as in our prior Annual Reports on Form 10-K and in other filings. The patent infringement proceedings are ongoing.

In October and November 2023, Beerenberg Korea Ltd. and Bronx (China) Co., Ltd. initiated invalidation actions against the Korean patents we asserted in the infringement actions against them. In September 2023, LG Chemical Co., Ltd. also initiated an invalidation action against one of the composition patents asserted against Beerenberg Services AS, Beerenberg Korea Ltd., and Bronx (China) Co., Ltd. We are vigorously defending the validity of our patents against these challenges.

Due to their nature, it is difficult to predict the outcome or the costs involved in any litigation or administrative proceedings, including any appeals process. Furthermore, the counter-parties in these proceedings may have significant resources and interest to litigate and therefore, these litigation matters could be protracted and may ultimately involve significant legal expenses. In addition to the foregoing, we have been and may be from time to time a party to other legal proceedings that arise in the ordinary course of business and to other patent enforcement actions to assert our patent rights.

In addition, we may fail to apply for patents on important technologies or innovative products in a timely fashion, if at all, and our existing and future patents may not be sufficiently broad to prevent others from practicing our technologies or from developing competing products or technologies, in particular given the long history of aerogel development. Furthermore, third parties could practice our intellectual property rights in territories where we do not have patent protection or where processes for remedies for infringement of intellectual property are unclear or still evolving. Such third parties may then try to import products made using our intellectual property rights into the United States or other countries. We may not be able to prevent such imports practically even if we obtain appropriate legal remedies. Our strategy is to seek registration of trademarks for our brands in many, but not all, of the jurisdictions in which we sell our products based on various factors, including our sales volumes in the jurisdiction, our ability to enforce local laws, and cost. Our strategy may not be adequate to protect our brands in all circumstances, especially in foreign jurisdictions. In certain jurisdictions, third parties may seek to register trademarks on the names of our products and brands before we do, thus requiring us to change branding strategies or otherwise deal with the issue.

Our pending patent applications are directed to various enabling technologies for the product forms, applications and manufacturing technologies that support our current business, as well as aspects of products under development or contemplated for the future. The issuance of patents from these applications involves complex legal and factual questions and, thus, we cannot provide assurance that any of our pending patent applications will result in the issuance of patents to us. The USPTO, relevant foreign patent offices and other relevant patent tribunals may deny or require significant narrowing of claims in our pending patent applications. Patents issued as a result of any of our pending patent applications may not cover our enabling technology and/or the products or processes that support our current or future business or afford us with significant commercial protection against others with similar technology. Proceedings before the USPTO or foreign patent offices could result in adverse decisions as to the priority of our inventions and the narrowing or invalidation of claims in issued patents. In addition, our pending patent applications filed in foreign countries are subject to laws, rules and procedures that differ from those of the United States, and thus foreign patent applications may not be granted even if counterpart United States patents are issued.

Our potential inability to adequately protect our intellectual property as a result of engaging external manufacturing facilities in China for the supplemental supply of our aerogel products for our customers in the energy industrial market could negatively impact our performance.

In connection with our engagement of external manufacturing facilities in China, we expect to implement customary manufacturer safeguards onsite, such as the use of confidentiality agreements with employees, to protect our proprietary information and technologies during the manufacturing process of our aerogel products for the energy industrial market. However, these safeguards may not effectively prevent unauthorized use of such information and technical know-how, or prevent the external manufacturing facilities from retaining them. Although the courts in China are increasing and broadening their protection of intellectual property rights, the legal regime governing intellectual property rights in China is relatively immature and it is often difficult to create and enforce intellectual property rights or protect trade secrets there. We face risks that our proprietary information may not be afforded the same protection in China as it is in countries with well-developed intellectual property laws, and local laws may not provide an adequate remedy in the event of unauthorized disclosure of confidential information. Costly and time-consuming litigation could be necessary to enforce and determine the scope of our proprietary rights in China, and failure to obtain or maintain trade secret protection could adversely affect our competitive business position. In the event that the third-party external manufacturing facilities of our proprietary aerogel product misappropriates our intellectual property, our business, prospects and financial condition could be materially and adversely affected.

We have initiated intellectual property litigation that is and will continue to be costly, and could limit or invalidate our intellectual property rights, divert time and efforts away from business operations, require us to pay damages and/or costs and expenses and/or otherwise have a material adverse impact on our business, and we could become subject to additional such intellectual property litigation in the future.

The success of our business is highly dependent on protecting our intellectual property rights. Unauthorized parties may attempt to copy or otherwise obtain and use our products and/or enabling technology. Policing the unauthorized use of our intellectual property rights is difficult and expensive, as is enforcing these rights against unauthorized use by others. Identifying unauthorized use of our intellectual property rights is difficult because we may be unable to monitor the technologies and/or materials being employed by other parties. The steps we have taken or will take may not prevent unauthorized use of our intellectual property rights, particularly in foreign countries where enforcement of intellectual property rights may be more difficult than in the United States.

Our continued commercial success will also depend in part upon not infringing the patents or violating other intellectual property rights of third parties. We are aware of patents and patent applications generally relating to aspects of our technologies filed by, and issued to, third parties. We cannot determine with certainty whether patents or patent applications of other parties may materially affect our ability to conduct our business. There may be existing patents of which we are unaware that we may inadvertently infringe, resulting in claims against us or our customers. In recent years, Chinese, Japanese and South Korean entities have filed a significant number of patent applications related to aerogel products in both their home countries and in foreign countries. These patents in application areas of aerogels may make it more difficult for OEMs and end-user customers in these countries to use our products in new and different applications, which in turn may limit our ability to penetrate new markets.

In the event that the manufacture, use and/or sale of our products or technologies is challenged, or if our product forms or technologies conflict with patent rights of others, or our operations conflict with trademark or similar rights of others, third parties could bring legal actions against us in the United States, Europe or other countries, claiming damages and seeking to enjoin the manufacturing and/or marketing of our products. In addition, it is not possible to predict with certainty what patent claims may arise from pending patent applications of third parties. In the United States, for example, patent prosecution can proceed in secret prior to issuance of a patent, provided such application is not filed in a foreign jurisdiction. For U.S. patent applications that are also filed in foreign

jurisdictions, such patent applications will not be published until 18 months from the filing date of the application. As a result, third parties may be able to obtain patents with claims relating to our product forms, applications and/or manufacturing processes which they could attempt to assert against us or our end-users.

In the case of any of the above, litigation may be necessary to enforce, protect or defend our intellectual property rights or to determine the validity and scope of the intellectual property rights of others. Any such litigation, including our ongoing patent enforcement actions described above, could be unsuccessful, cause us to incur substantial costs, divert resources and the efforts of our personnel away from daily operations, harm our reputation, and/or result in the impairment of our intellectual property rights. In some cases, litigation may be threatened or brought by a patent holding company (otherwise known as non-practicing entities or patent “trolls”) or other adverse patent owner who has no relevant product revenues and against which our patents may provide little or no deterrence. If we are found to infringe any patents, regardless of whether litigation is brought against us by third parties or, as in the case of our ongoing patent enforcement actions described above, brought by us against third parties, we could be required to:

- pay substantial monetary damages, including lost profits, reasonable royalties and/or treble damages if an infringement is found to be willful;
- totally discontinue or substantially modify any products or processes that are found to be in violation of another party’s intellectual property rights; and/or
- seek a license to continue making and selling our products and/or using our manufacturing processes, which we may not be able to obtain on reasonable terms, if at all, which could significantly increase our operating expenses and/or decrease our revenue.

In the actions brought by us against third parties, including our ongoing patent enforcement actions described above, we may be required to pay costs and expenses of opposing parties, including attorney fees, if we lose.

If our competitors are able to use our technology without payment to us, our ability to compete effectively could be materially harmed. Our contracts generally indemnify our customers for third-party claims of intellectual property infringement related to the manufacture and use of our products, and typically up to the amount of the purchase price paid for the product, which could cause us to become involved, and subject to liability, in litigation between our customers and third parties. The expense of defending these claims may adversely affect our results of operations.

Patents covering technologies that are similar or superior to our technologies may be developed or obtained by third parties. We may need to seek licenses to these technologies, which could limit our ability to manufacture our products and have a material adverse effect on our business and results of operations.

Competitors or other third parties may independently develop and obtain patents covering technologies that are similar or superior to the product forms, applications or manufacturing technologies that we employ. In such event, we may need to obtain licenses for these technologies. However, we may not be able to obtain licenses on reasonable terms, if at all, which could limit our ability to manufacture our current and/or future products and operate our business.

Our contracts with third parties could negatively affect our intellectual property rights.

To further our product development efforts, our scientists and engineers work closely with customers and other third parties to research and develop advancements in aerogel product forms, applications, and manufacturing technologies. We have entered into agreements with private third parties to independently or jointly research, design, and develop new devices and systems that incorporate aerogel material. In some instances, the research and development activities that we conduct under contract with private third parties may produce intellectual property to which we may not have ownership or exclusive rights and will be unable to protect or monetize.

Furthermore, there could be disputes between us and a private third party as to the ownership rights to any inventions that we develop in collaboration with such third party. Any such dispute may cause us to incur substantial costs including potential license obligations, and could place a significant strain on our financial resources, divert the attention of management from our core business, and harm our reputation.

We rely on trade secrets to protect our technology, and our failure to obtain or maintain trade secret protection could materially adversely affect our competitive business position.

We rely in part on trade secret protection to protect confidential and proprietary information relating to our technology, particularly where we do not

believe patent protection is appropriate or obtainable. We continue to develop and refine the manufacturing technologies used to produce our aerogel products and believe that we have already developed, and will continue to develop, significant know-how related to these technologies. However, trade secrets can be difficult to protect. We may not be able to maintain the secrecy of this information and competitors may develop or acquire equally or more valuable information related to the manufacture of comparable aerogel products. Our strategy for scale-up of commercial production will continue to require us to share confidential and proprietary information with the U.S. government and other third parties. While we take reasonable efforts to protect our trade secrets, our employees, consultants, contractors or scientific and other advisors, or those of our business partners, may intentionally or inadvertently disclose our confidential and proprietary information to competitors. Any enforcement of claims by us that a third party has obtained and is using our trade secrets is expensive, time consuming and uncertain. In addition, foreign courts are sometimes less willing than United States courts to protect trade secrets.

We require all employees and consultants to execute confidentiality and/or nondisclosure agreements upon the commencement of an employment or consulting arrangement with us, which agreements generally require that all confidential and proprietary information developed by the individual or made known to the individual by us during the course of the individual's relationship with us be kept confidential and not disclosed to third parties. These agreements further generally provide that inventions conceived by the individual in the course of rendering services to us will be our exclusive property. Nevertheless, these agreements may not be honored and our confidential and proprietary information may be disclosed, or these agreements may be unenforceable or difficult to enforce. We also require customers and vendors to execute confidentiality and/or nondisclosure agreements. However, we have not obtained such agreements from all of our customers and vendors. Moreover, some of our customers may be subject to laws and regulations that require them to disclose information that we would otherwise seek to keep confidential. Our confidential and proprietary information may be otherwise disclosed without our authorization or knowledge. Moreover, third parties could reverse engineer our manufacturing processes, independently develop substantially equivalent confidential and proprietary information or otherwise gain access to our trade secrets. Additionally, cyber security threats, especially originating from countries such as China, Russia, Iran, and North Korea as broadly reported in the media, pose a significant risk to maintaining control of our trade secrets. Failure to maintain trade secret protection could enable others to produce competing products and adversely affect our competitive business position.

Risks Related to Our Data Privacy and Other Personal Information

We may be subject to, or may in the future become subject to, U.S. federal and state, and foreign laws and regulations imposing obligations on how we collect, use, disclose, store, and process personal information. Our actual or perceived failure to comply with such obligations could result in liability or reputational harm and could harm our business. Ensuring compliance with such laws could also impair our efforts to maintain and expand our customer base, and thereby decrease our revenue.

We are subject to data protection laws and regulations that address privacy and data security. The legislative and regulatory landscape for data protection continues to evolve, and in recent years there has been an increasing focus on privacy and data security issues. In the United States, numerous federal and state laws and regulations, including state data breach notification laws, state health information privacy laws and federal and state consumer protection laws govern the collection, use, disclosure and protection of health-related and other personal information. Failure to comply with data protection laws and regulations could result in government enforcement actions, which could include civil or criminal penalties, private litigation and/or adverse publicity and could negatively affect our operating results and business. For example, in January of 2020, the California Consumer Privacy Act, or CCPA, went into effect, which marked the first U.S. state to adopt comprehensive privacy legislation. The CCPA establishes a new privacy framework for covered businesses by creating an expanded definition of personal information, establishing new data privacy rights for California residents, and creating a new and potentially severe statutory damages framework for violations of the CCPA and for businesses that fail to implement reasonable security procedures and practices to prevent data breaches. The CCPA has also been substantially amended by a voter-approved ballot initiative called the California Privacy Rights Act, or CPRA. The CPRA, which took full effect in January of 2023, significantly modifies the CCPA, potentially resulting in further uncertainty, additional costs and expenses in an effort to comply and additional potential for harm and liability for failure to comply. Among other things, the CPRA established a new regulatory authority, the California Privacy Protection Agency, which is tasked with enacting new regulations under the CPRA and will have expensed enforcement authority. In addition, since 2021, Virginia, Colorado, Connecticut and Utah all enacted new data privacy laws which took effect in 2023 that have similarities to the CCPA and CPRA, but also have significant differences from the California laws, and from each other, creating compliance challenges across different jurisdictions. Other states, including Massachusetts, are considering expansive data privacy laws.

Numerous other countries have, or are developing, laws governing the collection, use and transmission of personal information as well. EU member states and other jurisdictions have adopted data protection laws and regulations, which impose significant compliance obligations.

On May 25, 2018, the GDPR went into effect, implementing a broad data protection framework that expanded the scope of EU data protection law, including to non-EU entities that process, or control the processing of, personal data relating to individuals located in the EU. The GDPR sets out a number of

requirements that must be complied with when handling the personal data of EU based data subjects, including: providing expanded disclosures about how their personal data will be used; higher standards for organizations to demonstrate that they have obtained valid consent or have another legal basis in place to justify their data processing activities; the obligation to appoint data protection officers in certain circumstances; new rights for individuals to be “forgotten” and rights to data portability, as well as enhanced current rights (e.g. access requests); the principal of accountability and demonstrating compliance through policies, procedures, training and audit; and a new mandatory data breach regime. In particular, medical or health data, genetic data and biometric data where the latter is used to uniquely identify an individual are all classified as “special category” data under the GDPR and afford greater protection and require additional compliance obligations. Further, EU member states have a broad right to impose additional conditions—including restrictions—on these data categories. This is because the GDPR allows EU member states to derogate from the requirements of the GDPR mainly in regard to specific processing situations (including special category data and processing for scientific or statistical purposes). For example, we are subject to the GDPR and the German federal data privacy law, the Bundesdatenschutzgesetz, and we are subject to the regulatory authority of the Baden-Württemberg data protection authority. As the EU states continue to reframe their national legislation to harmonize with the GDPR, we will need to monitor compliance with all relevant EU member states’ laws and regulations, including where permitted derogation from the GDPR are introduced.

We are also subject to evolving EU laws on data export, because we transfer data outside the EU to ourselves or third parties. The GDPR only permits exports of data outside the EU where there is a suitable data transfer solution in place to safeguard personal data (e.g. the EU Commission approved Standard Contractual Clauses). On July 16, 2020, the Court of Justice of the EU (CJEU) issued a landmark opinion in the case of Maximilian Schrems vs. Facebook (Case C-311/18) (Schrems II). This decision calls into question certain data transfer mechanisms as between the EU member states and the US. The CJEU is the highest court in Europe and the Schrems II decision heightens the burden on data importers to assess the impact of U.S. national security laws on their business. Future actions which may be initiated by EU data protection authorities are difficult to predict at this time. Consequently, there is some risk of any data transfers from the EU being halted. If we have to rely on third parties to carry out services for us, including processing personal data on our behalf, we are required under GDPR to enter into contractual arrangements to help ensure that these third parties only process such data according to our instructions and have sufficient security measures in place. Any security breach or non-compliance with our contractual terms or breach of applicable law by such third parties could result in enforcement actions, litigation, fines and penalties or adverse publicity and could cause customers to lose trust in us, which would have an adverse impact on our reputation and business. Any contractual arrangements requiring the processing of personal data from the EU to us in the United States will require greater scrutiny and assessments as required under Schrems II and may have an adverse impact on cross-border transfers of personal data, or increase costs of compliance. The GDPR provides an enforcement authority to impose large penalties for noncompliance, including the potential for fines of up to €20 million or 4% of the annual global revenues of the noncompliant company, whichever is greater.

Applicable data privacy and data protection laws may conflict with each other, and by complying with the laws or regulations of one jurisdiction, we may find that we are violating the laws or regulations of another jurisdiction.

Despite our efforts, we may not have fully complied in the past and may not in the future. Failure to comply with current and future laws and regulations could result in government enforcement actions (including the imposition of significant penalties), criminal and civil liability for us and our officers and directors, private litigation and/or adverse publicity that negatively affects our business.

Risks Related to Our Common Stock

We have incurred and will continue to incur increased costs and demands upon management as a result of complying with the laws and regulations affecting public companies in the United States, which may adversely affect our results of operations.

As a public company we have incurred and will continue to incur significant legal, accounting and other expenses that we did not incur as a private company. The Sarbanes-Oxley Act of 2002, the Dodd-Frank Wall Street Reform and Consumer Protection Act, the listing requirements of The New York Stock Exchange and other applicable securities rules and regulations impose various requirements on public companies, including establishment and maintenance of effective disclosure and financial controls and corporate governance practices. Moreover, these rules and regulations will increase our legal and financial compliance costs and will make some activities more time-consuming. We are subject to the reporting requirements of the Exchange Act that require us to file, among other things, quarterly reports on Form 10-Q and annual reports on Form 10-K. Under Section 302 of the Sarbanes-Oxley Act of 2002, or the Sarbanes-Oxley Act, as a part of each of these reports, our chief executive officer and chief financial officer are required to evaluate and report their conclusions regarding the effectiveness of our disclosure controls and procedures and to certify that they have done so. Effective internal controls are necessary for us to provide reliable financial reports and prevent fraud. The process of documenting our internal controls and complying with Section 404 is expensive and time consuming, and requires significant attention of management.

Complying with these requirements applicable to public companies may place a strain on our personnel, information technology systems and resources while diverting management's attention from other business concerns. We have engaged outside service providers with appropriate public company compliance experience and technical accounting knowledge to support our compliance efforts. We may need to engage additional service providers to ensure compliance which may cause us to incur additional operating costs.

These and other requirements may also make it more difficult or more costly for us to obtain or maintain certain types of insurance, including directors' and officers' liability insurance. We may be forced to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage.

The impact of these requirements could also make it more difficult for us to attract and retain qualified persons to serve on our Board of Directors, our board committees or as executive officers. Any one of these requirements could have a material adverse effect on our business, financial condition and results of operations.

Because we are a public company, we are obligated to develop and maintain proper and effective internal control over financial reporting. If our internal controls over financial reporting are determined to be ineffective, or if our auditors are otherwise unable to attest to their effectiveness, investor confidence in our company, and our common stock price, may be adversely affected.

Pursuant to Section 404a of the Sarbanes-Oxley Act, we have furnished a report by management on the effectiveness of our internal control over financial reporting for the fiscal year ended December 31, 2023 and will continue to do so in each year thereafter. This assessment is required to include disclosure of any material weaknesses identified by our management in our internal control over financial reporting. Our independent registered public accounting firm is required to formally attest to the effectiveness of our internal control over financial reporting for the year ended December 31, 2023 and subsequent years.

We continue to assess our system of internal controls over financial reporting and successfully completed documentation necessary to perform the annual evaluation required to comply with Section 404. In future periods, we may discover, and not be able to remediate timely, significant deficiencies or material weaknesses.

If we were to identify one or more material weaknesses in our internal control, we may be unable to assert that our internal controls are effective. If we are unable to assert that our internal controls over financial reporting are effective, we could lose investor confidence in the accuracy and completeness of our financial reports or it could cause us to fail to meet our reporting obligations, which could have a material adverse effect on the price of our common stock. In addition, any failure to comply with Section 404 could subject us to a variety of administrative sanctions, including SEC action, ineligibility for short form resale registration, the suspension or delisting of our common stock from The New York Stock Exchange, and the inability of registered broker-dealers to make a market in our common stock, which would further reduce our stock price and could harm our business.

The trading market in our common stock has been limited and substantially less liquid than the average trading market for a stock quoted on The New York Stock Exchange.

Since our initial listing on The New York Stock Exchange on June 13, 2014, the trading market in our common stock has been limited and substantially less liquid than the average trading market for companies listed on The New York Stock Exchange. The listing of our common stock on The New York Stock Exchange does not assure that a meaningful, consistent and liquid trading market currently exists or will exist in the future. We cannot predict whether a more active market for our common stock will develop in the future. An absence of an active trading market could adversely affect our stockholders' ability to sell our common stock at current market prices in short time periods, or possibly at all. An inactive market may also impair our ability to raise capital by selling our common stock and may impair our ability to acquire other companies, products or technologies by using our common stock as consideration. Additionally, analyst coverage of our common stock may be limited and such lack of coverage may have a depressive effect on the market price for our common stock. As of December 31, 2023, approximately 23.3% of our outstanding shares of common stock were held by our executive officers, directors and 5% or greater stockholders and their respective affiliates, which may adversely affect the liquidity of the trading market for our common stock, in as much as federal securities laws restrict sales of our shares by these stockholders. If our affiliates continue to hold their shares of common stock, there will be a more limited trading volume in our common stock, which may make it more difficult for investors to sell their shares or increase the volatility of our stock price.

We expect that the price of our common stock will fluctuate substantially, which could subject us to securities class action litigation and result in substantial losses to our stockholders.

The price of our common stock fluctuates in a broad range. For example, on January 2, 2019 the closing price of our shares of common stock was \$2.22 and on November 18, 2021, the closing price of our shares of common stock was \$63.66. Such fluctuations may be due to a number of factors, including the following, some of which are beyond our control:

- volume and timing of orders for our products;
- quarterly and yearly variations in our or our competitors' results of operations;
- our announcement or our competitors' announcements regarding new products, product enhancements, significant contracts, number of distributors, acquisitions or strategic investments;
- announcements or speculation regarding the activities or plans of our automotive OEM customers and the perceived impact on their demand for our products;
- announcements of technological innovations relating to aerogels, thermal management and energy industrial insulation;
- results of operations or projections that vary from the expectations of securities analysts and investors;
- the periodic nature of our sales cycles, in particular for capital projects in the energy industrial market;
- our ability to develop, obtain regulatory clearance or approval for and market new and enhanced products on a timely basis;
- future sales of our common stock, including sales by our executive officers, directors and significant stockholders and their respective affiliates;
- announcements by third parties of significant claims or proceedings against us, including with regard to intellectual property and product liability;
- changes in accounting principles; and
- general U.S. and global economic conditions and other factors, including factors unrelated to our operating performance or the operating performance of our competitors.

Furthermore, the U.S. stock market has at times experienced extreme volatility that in some cases has been unrelated or disproportionate to the operating performance of particular companies. These broad market and industry fluctuations may adversely affect the market price of our common stock, regardless of our actual operating performance.

In the past, following periods of market volatility, stockholders have instituted securities class action litigation. If we become involved in securities litigation, it could have a substantial cost and divert resources and the attention of our senior management team from our business regardless of the outcome of such litigation.

Securities analysts may not continue coverage of our common stock or may issue negative reports, which may have a negative impact on the market price of our common stock.

The trading market for our common stock relies in part on the research and reports that industry or financial analysts publish about us or our business. Securities analysts may elect not to provide research coverage of our common stock. If securities analysts do not cover or continue to cover our common stock, the lack of research coverage may cause the market price of our common stock to decline. If one or more of the analysts who elects to cover us downgrades our stock, our stock price would likely decline substantially. If one or more of these analysts ceases coverage of us, we could lose visibility in the market, which in turn could cause our stock price to decline. In addition, rules mandated by the Sarbanes-Oxley Act and a global settlement reached in 2003 between the SEC, other regulatory agencies and a number of investment banks have led to a number of fundamental changes in how analysts are reviewed and compensated. In particular, many investment banking firms are required to contract with independent financial analysts for their stock research. It may be difficult for companies such as ours, with smaller market capitalizations, to attract independent financial analysts that will cover our common stock. This could have a negative effect on the market price of our stock.

Our directors, officers and principal stockholders have significant voting power and may take actions that may not be in the best interests of our other stockholders.

As of December 31, 2023, our executive officers, directors and 5% or greater stockholders and their affiliates collectively controlled approximately 23.3% of our outstanding shares of common stock. As a result, these stockholders, if they act together, may be able to influence the management and affairs of our company and certain matters requiring stockholder approval, including the election of directors and approval of significant corporate transactions. This concentration of ownership may have the effect of delaying or preventing a change of control and might adversely affect the market price of our common stock. This concentration of ownership may not be in the best interests of our other stockholders.

Anti-takeover provisions in our restated certificate of incorporation and restated bylaws, and Delaware law, could delay or discourage a takeover.

Anti-takeover provisions in our restated certificate of incorporation and restated bylaws and Delaware law may have the effect of deterring or delaying attempts by our stockholders to remove or replace management, engage in proxy contests and effect changes in control. The provisions of our charter documents include:

- procedures for advance notification of stockholder nominations and proposals;
- the inability of our stockholders to call a special meeting of the stockholders and the inability of our stockholders to act by written consent;
- the ability of our Board of Directors to create new directorships and to fill any vacancies on the Board of Directors;
- the ability of our Board of Directors to amend our restated bylaws without stockholder approval; and
- the ability of our Board of Directors to issue up to 5,000,000 shares of preferred stock without stockholder approval upon the terms and conditions and with the rights, privileges and preferences as our Board of Directors may determine.

In addition, as a Delaware corporation, we are subject to Delaware law, including Section 203 of the Delaware General Corporation Law. In general, Section 203 prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years following the date that the stockholder became an interested stockholder unless certain specific requirements are met as set forth in Section 203. These provisions, alone or together, could have the effect of deterring or delaying changes in incumbent management, proxy contests or changes in control.

Our restated certificate of incorporation designates a state or federal court located within the State of Delaware as the exclusive forum for certain types of actions and proceedings that may be initiated by our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our restated certificate of incorporation provides that, subject to limited exceptions, a state or federal court located within the State of Delaware will be the exclusive forum for (1) any derivative action or proceeding brought on our behalf, (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or other employees to us or our stockholders, (3) any action asserting a claim against us arising pursuant to any provision of the Delaware General Corporation Law, our restated certificate of incorporation or our restated bylaws, or (4) any other action asserting a claim against us that is governed by the internal affairs doctrine. This exclusive forum provision does not apply to suits brought to enforce a duty or liability created by the Exchange Act. It could apply, however, to a suit that falls within one or more of the categories enumerated in the exclusive forum provision and asserts claims under the Securities Act, inasmuch as Section 22 of the Securities Act creates concurrent jurisdiction for federal and state courts over all suits brought to enforce any duty or liability created by the Securities Act or the rule and regulations thereunder. There is uncertainty as to whether a court would enforce such provision with respect to claims under the Securities Act, and our stockholders will not be deemed to have waived our compliance with the federal securities laws and the rules and regulations thereunder. Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock shall be deemed to have notice of and to have consented to the provisions of our restated certificate of incorporation described above. This choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and employees. Alternatively, if a court were to find these provisions of our restated certificate of incorporation inapplicable to, or unenforceable in respect of, one or more of the specified types of actions or proceedings, we may incur additional costs associated with resolving such matters in other jurisdictions, which could adversely affect our business and financial condition.

Our shareholders may experience future dilution as a result of future equity offerings.

In addition to the February 18, 2022 issuance of convertible notes with a principal amount of \$100.0 million that, along with any accrued principal-in-kind interest, are convertible into shares of our common stock, and our issuance of 6,060,607 shares of common stock in a registered public offering in December 2023, we may offer additional shares of our common stock or other securities convertible into or exchangeable for our common stock in order to raise additional capital in the future, particularly as we look to finance our planned second manufacturing facility in Bulloch County, Georgia. We cannot assure our shareholders that we will be able to sell shares or other securities in any other offering at a price per share that is equal to or greater than the price per share our shareholders paid for our shares. Investors purchasing shares or other securities in the future could have rights, preferences or privileges senior to those of our shareholders and our shareholders may experience dilution. Our shareholders may incur additional dilution upon the exercise of any outstanding stock options or warrants, the issuance of shares of restricted stock, the vesting of restricted stock units, or the issuance, vesting or exercise of other equity awards.

We do not intend to pay cash dividends in the foreseeable future and, consequently, our shareholders' ability to achieve a return on their investment will depend on appreciation in the price of our common stock.

We have never declared or paid cash dividends on our common stock and we do not intend to pay any cash dividends on our common stock in the foreseeable future. We currently expect to retain all available funds and any future earnings for use in the operation and expansion of our business. In addition, the terms of our revolving credit facility restrict our ability to pay dividends and any future credit facilities, loan agreements, debt instruments or other agreements may further restrict our ability to pay dividends. Payments of future dividends, if any, will be at the discretion of our Board of Directors after taking into account various factors, including our business, results of operations and financial condition, current and anticipated cash needs, plans for expansion and any legal or contractual limitations on our ability to pay dividends. As a result, capital appreciation, if any, of our common stock will be our shareholders' sole source of potential gain for the foreseeable future.

CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING STATEMENTS

This report includes forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Exchange Act that relate to future events or our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to differ materially from any future results, levels of activity, performance or achievements expressed or implied by these forward-looking statements. Words such as, but not limited to, "believe," "expect," "anticipate," "estimate," "intend," "seek," "may," "plan," "potential," "predict," "project," "targets," "likely," "will," "would," "could," "should," "continue," and similar expressions or phrases, or the negative of those expressions or phrases, are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Although we believe that we have a reasonable basis for each forward-looking statement contained in this report, we caution you that these statements are based on our projections of the future that are subject to known and unknown risks and uncertainties and other factors that may cause our actual results, level of activity, performance or achievements expressed or implied by these forward-looking statements, to differ. The description of our Business set forth in Item 1, the Risk Factors set forth in this Item 1A and our Management's Discussion and Analysis of Financial Condition and Results of Operations set forth in Item 7 as well as other sections in this report, discuss some of the factors that could contribute to these differences. These forward-looking statements include, among other things, statements about:

- the expected future growth of the market for our aerogel products and our continued gain in market share, in particular in the EV market, the energy industrial insulation market, the lithium-ion battery thermal barrier markets, and other markets we target;
- our beliefs about the competitive strengths and value propositions of our technology and our products and our ability to gain additional market share and enter into new markets based on those strengths;
- our expectation that our investment in incremental manufacturing and operating expense will sustain long-term growth in our existing markets and develop new business opportunities;
- our plans to continue to develop and optimize aerogel products for high-value applications within the sustainable insulation materials market and our plan to realize revenue from this market;
- our plans and expectations to partner with industry leaders in the battery and EV market or such partnerships resulting in products and technologies or otherwise resulting in meaningful financial results;
- our expectations about the size and timing of awarded business in the EV market, future revenues and profit margins, arising from our supply relationship and contract with automotive OEMs and our ability to win more business and increase revenue in the EV market;

- our pursuit of high-value opportunities for our aerogel products within different segments of the EV market, the global insulation market, including the sustainable insulation materials market, and our plans to leverage our aerogel technology platform to develop innovative, aerogel enhanced products for applications in new markets;
- our plans to focus additional resources to continue to grow our share of the EV market and the energy industrial insulation market;
- the current or future trends in the energy, energy industrial, chemical and refinery, liquid natural gas, or LNG, sustainable insulation materials, EV thermal barrier, EV battery materials or other markets and the impact of these trends on our business;
- our investments in the EV market and aerogel technology platform;
- our pursuit of and the expected greater adoption of our products in the LNG and power generation markets and our expectation that product revenue will be generated in large part by demand for insulation associated with scheduled plant shutdowns, or turnarounds, and other maintenance-related projects;
- our expectation that our products will be specified during the design phase in a growing number of new plant construction and capital expansion projects and our expectation that we will have an increasing percentage of our products sold for use in capital projects;
- our expectation that the growth in global energy demand and EV market will result in increased new-build and large capacity expansion projects, driving demand for our aerogel products;
- our plans to continue our strategy of working with innovative companies to target and penetrate additional market opportunities;
- our plans to develop strategic partnerships to facilitate market penetration beyond the energy industrial and sustainable insulation materials market, as well as the expected goals and priorities of such strategic partnerships;
- our belief that an adequate long-term supply of silica-precursors and other raw materials is available and that our plans to reduce reliance on precursors susceptible to significant price fluctuations will be successful;
- our belief that we can strategically increase our capacity to meet the demand or that we will be able to make such capacity increases in a timely manner;
- our expectation in our ability to implement lower cost product formulations and realize material purchasing efficiencies;
- our belief that our portfolio of patents, trade secrets and know-how present a significant barrier to potential new entrants in the production of aerogel blanket insulation;
- our expectation that we will be successful in enforcing and defending our patents against competitors and that such patents are valid and enforceable, as well as our expectations about the costs and consequences of our current or potential future patent litigation and the potential for additional patent litigation;
- our belief that our products possess strong competitive advantages over traditional insulation materials, including the superior thermal performance and the thin, easy-to-use and durable blanket form of our products;
- our belief that we can finance the construction and development of our second manufacturing facility in Statesboro, Georgia and continued productivity improvements to our second manufacturing facility and all related thermal assembly facilities and equipment and that we may obtain the required additional funding, which may include one or more equity, equity-linked or debt financings, in the future to complete these projects;
- our expectations regarding the investment to open a second manufacturing facility in Georgia, the extended construction and commissioning timeframe for the planned second manufacturing facility, our efforts to manage the construction of the second plant to align with our expectations of demand from EV customers;
- the anticipated aerogel capacity expansion as a result of the planned second manufacturing facility in Georgia and the expected commencement of production;
- our beliefs about the Department of Energy loan application process;
- our belief that our end-use customers will continue to invest in major energy industrial projects;
- our expectation that we will continue to sell our products in the sustainable insulation materials and other end markets;
- our expectations that our work with partners will accelerate the commercialization of these carbon aerogel anode materials in the EV market;

- our belief that the potential for significant technological innovation in traditional insulation materials is limited and that new high-performance materials will be required to meet evolving market requirements for energy efficient insulation systems;
- our belief that our aerogel products and manufacturing processes are proprietary and that we can protect our patents, trade secrets and know-how associated therewith;
- our belief that we can continue to improve the cost efficiency of our manufacturing process, that our current expansion plans offer attractive returns on incremental invested capital, and that we will focus our development efforts on new products and next generation technology with application in new, high value market segments;
- our belief that we will have opportunities to address additional high value applications in the multi-billion dollar global insulation market, and that we are well-positioned to leverage a decade's worth of research and development to design and commercialize disruptive aerogel products for a wide array of new markets;
- our expectations about future material costs and manufacturing expenses as a percentage of revenue, including the impact of engaging one or more external manufacturing facilities in China for the supplemental supply of our energy industrial products; our expectation about the ability of the Chinese external manufacturing facilities that we engage to consistently supply the aerogel product that we order in a timely manner;
- our belief that our products have the lowest cost on a fully-installed basis or offer significant life-cycle cost savings in energy industrial and certain other applications as compared to traditional insulation materials;
- our plans to continue to expand our global sales force and distribution network to support anticipated growth in customers and demand for our products and our plans to seek to promote greater enterprise-wide utilization of our products by existing end-use customers;
- our expectations and projections about future revenues, revenue growth, costs, expenses, production volumes, manufacturing productivity, gross profit, profitability, net loss, loss per share and Adjusted EBITDA, sources and uses of cash, liquidity, cash flow, capital requirements and the sufficiency of our existing cash balance and available credit;
- our expectations that most of our revenue will continue to come from a relatively small number of customers for the foreseeable future;
- our expectations of long-term revenue growth, with increasing levels of gross profit and improved cash flows from operations and our expectations that we will incur significant capital expenditures related to the expansion of our manufacturing capacity to support this expected long-term growth in demand;
- our expectations that the operating expenses will increase in absolute dollars and decrease as a percentage of revenue in 2024 and in the long term, our research and development expenses will increase in absolute dollars and decrease as a percentage of revenue in 2024 and in the long term, our sales and marketing expenses will increase in absolute dollars and decrease as a percentage of revenue in 2024 and in the long term, and our general and administrative expenses will increase in absolute dollars and decrease as a percentage of revenue in 2024 and in the long term;
- our expectation to continue to increase investment in research and development in our efforts to enhance and expand our aerogel technology platform;
- our expectations about the impact of new accounting pronouncements on our consolidated financial statements and related disclosures;
- our belief that our experienced and dedicated leadership team will provide us with a competitive advantage in the industry;
- our belief of our technological and market leadership in aerogels;
- the expected future development of new aerogel technologies;
- our expectations about limitations of net operating losses;
- our expectation of rising interest rates and operating costs;
- rising inflation;
- our expectation of starting up our planned second plant and our ability to do so at a cost consistent with our prior estimates;

- our beliefs about our Mexico thermal barrier assembly facility and its timely operations, its ability to meet the demand, the growth in thermal barrier demand to match the assembly operation and vice versa; and
- our ability to shift thermal barrier assembly operations from East Providence, Rhode Island to Mexico in a timely manner.

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. We have included important cautionary statements in this report, particularly in the Risk Factors set forth in Item 1A of this Annual Report on Form 10-K, that we believe could cause actual results or events to differ materially from the forward-looking statements that we make. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments we may make.

You should read this report and the documents that we reference in this report and have filed as exhibits to this report completely and with the understanding that our actual future results may be materially different from what we expect. The forward-looking statements contained in this report are made as of the date of this report, and we do not assume, and specifically disclaim, any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise.

Item 1B. UNRESOLVED STAFF COMMENTS

None.

Item 1C. CYBERSECURITY

We recognize the critical importance of maintaining the trust and confidence of customers, suppliers, business partners and employees toward our business and are committed to protecting the confidentiality, integrity and availability of our business operations and systems. Our Board of Directors is actively involved in oversight of our risk management activities, and cybersecurity represents an important element of our overall approach to risk management. Our cybersecurity policies, standards, processes and practices are based on recognized frameworks established by the National Institute of Standards and Technology, or NIST, the International Organization for Standardization and other applicable industry standards. Our customers' requirements for their suppliers to have certain cybersecurity policies, standards and processes in place also drives and guides some of our policies and practices. In general, we seek to address cybersecurity risks through a comprehensive, cross-functional approach that is focused on preserving the confidentiality, security and availability of the information that we collect and store by identifying, preventing and mitigating cybersecurity threats and effectively responding to cybersecurity incidents when they occur.

Cybersecurity Risk Management and Strategy; Effect of Risk

We face risks related to cybersecurity such as unauthorized access, cybersecurity attacks and other security incidents, including as perpetrated by hackers and unintentional damage or disruption to hardware and software systems, loss of data, and misappropriation of confidential information. To identify and assess material risks from cybersecurity threats, we maintain a comprehensive cybersecurity program to ensure our systems are effective and prepared for information security risks. The program includes regular oversight of our programs for security monitoring for internal and external threats to ensure the confidentiality and integrity of our information assets. We consider risks from cybersecurity threats alongside other company risks as part of our overall risk assessment process. We employ a range of tools and services, including regular network and endpoint monitoring, audits, vulnerability assessments, penetration testing, threat modeling and tabletop exercises to inform our risk identification and assessment. As discussed in more detail under "Cybersecurity Governance" below, our Audit Committee provides oversight of our cybersecurity risk management and strategy processes, which are led by our Chief Financial Officer, Chief Legal Officer, Chief Information Officer and Director of Information Security.

We also identify our cybersecurity threat risks by comparing our processes to standards set by the NIST, International Organization for Standardization and the Center for Internet Security, as well as by engaging experts to attempt to infiltrate our information systems. To provide for the availability of critical data and systems, maintain regulatory compliance, manage our material risks from cybersecurity threats, and protect against and respond to cybersecurity incidents, we undertake the following activities:

- monitor emerging data protection laws and implement changes to our processes that are designed to comply with such laws;
- through our policies, practices and contracts (as applicable), require employees, as well as third parties that provide services on our behalf, to treat confidential information and data with care;

- employ technical safeguards that are designed to protect our information systems from cybersecurity threats, including firewalls, intrusion prevention and detection systems, anti-malware functionality and access controls, which are evaluated and improved through vulnerability assessments and cybersecurity threat intelligence;
- provide regular, mandatory training for our employees, Board members and certain contractors regarding cybersecurity threats as a means to equip them with effective tools to address cybersecurity threats and incident response preparedness, and to communicate our evolving information security policies, standards, processes and practices;
- conduct regular phishing email simulations for all employees and contractors with access to our email systems to enhance awareness and responsiveness to possible threats;
- conduct annual cybersecurity management and incident training for current employees involved in our systems and processes that handle sensitive data;
- run tabletop exercises to simulate a response to a cybersecurity incident and use the findings to improve our processes and technologies;
- leverage the NIST incident handling framework to help us identify, protect, detect, respond and recover when there is an actual or potential cybersecurity incident; and
- carry information security risk insurance that provides protection against the potential losses arising from a cybersecurity incident.

Our incident response plan coordinates the activities we take to prepare for, detect, respond to and recover from cybersecurity incidents, which include processes to triage, assess severity for, escalate, contain, investigate and remediate the incident, as well as to comply with potentially applicable legal obligations and mitigate damage to our business and reputation.

As part of the above processes, we periodically engage with consultants, auditors and other third parties, including having independent third-party consultants review our cybersecurity program to help identify areas for continued focus, improvement and compliance.

Our processes also address cybersecurity threat risks associated with our use of third-party service providers, including our suppliers and manufacturers who have access to customer, supplier and employee data or our systems. In addition, cybersecurity considerations affect the selection and oversight of our third-party service providers. We perform diligence on third parties that have access to our systems, data or facilities that house such systems or data, and continually monitor cybersecurity threat risks identified through such diligence. Additionally, we endeavor to require those third parties that could introduce significant cybersecurity risk to us to agree to manage their cybersecurity risks in specified ways.

We describe whether and how risks from identified cybersecurity threats, including as a result of any previous cybersecurity incidents, have materially affected or are reasonably likely to materially affect us, including our business strategy, results of operations, or financial condition, under the heading “Risks Related to Our Business and Strategy” which disclosures are incorporated by reference herein.

In the last three fiscal years, we have not experienced any material cybersecurity incidents and the expenses we have incurred from cybersecurity incidents were immaterial. This includes penalties and settlements, of which there were none.

Cybersecurity Governance; Management

Cybersecurity is an important part of our risk management processes and an area of focus for our Board of Directors and management. The Audit Committee of our Board of Directors is responsible for the oversight of risks from cybersecurity threats.

At least quarterly, our Audit Committee receives an update from management of our cybersecurity threat risk management and strategy processes covering topics such as data security posture, results from third-party assessments, progress towards pre-determined risk-mitigation-related goals, our incident response plan, and material cybersecurity threat risks or incidents and developments, as well as the steps management has taken to respond to such risks. In such sessions, our Audit Committee generally receives materials discussing current and emerging material cybersecurity threat risks, and describing our ability to mitigate those risks, as well as recent developments, evolving standards, technological developments and information security considerations arising with respect to our peers and third parties, and discusses such matters with our Director of Information Security and Chief Information Officer. Our Audit Committee also receives prompt and timely information regarding any cybersecurity incident that meets established reporting thresholds, as well as ongoing updates regarding any such incident until it has been addressed.

Members of our Audit Committee and Board of Directors are also encouraged to regularly engage in conversations with management on cybersecurity-related news events and discuss any updates to our cybersecurity risk management and strategy programs. Members of our Audit Committee and Board of Directors continue to receive updates around the cybersecurity threat landscape and ongoing best practices as a means of continuing education in the area. Material cybersecurity threat risks are also considered during separate board meeting discussions of important matters like enterprise risk management, operational budgeting, business continuity planning, mergers and acquisitions, brand management, and other relevant matters.

Our cybersecurity risk management and strategy processes, which are discussed in greater detail above, are led by our Chief Information Officer, Director of Information Security, Chief Financial Officer and Chief Legal Officer. Such individuals have collectively over 40 years of prior work experience in various roles involving managing information security, developing cybersecurity strategy, implementing effective information and cybersecurity programs, as well as several relevant degrees and certifications, including Certified Information Security Manager, Certified Information Systems Auditor, Certified Information Systems Security Professional, Global Information Assurance Certification, Certified Professional Hacker. These management team members are informed about and monitor the prevention, mitigation, detection, and remediation of cybersecurity incidents through their management of, and participation in, the cybersecurity risk management and strategy processes described above, including the operation of our incident response plan. As discussed above, these management team members report to the Audit Committee of our Board of Directors about cybersecurity threat risks, among other cybersecurity related matters, on a quarterly basis.

Item 2. PROPERTIES

Our corporate headquarters are located in Northborough, Massachusetts, where we occupy approximately 51,650 square feet under a lease expiring on December 31, 2031. We also own an approximately 148,000 square foot manufacturing facility in East Providence, Rhode Island. We lease additional spaces for research, administrative, manufacturing, and warehousing purposes in six locations in the United States and two in Mexico under leases expiring between January 31, 2024 and April 30, 2034. The table below shows a summary of the square footage of these locations as of December 31, 2023:

| Leased Properties by Location (In square ft.) | |
|--|---------|
| East Providence, RI | 201,033 |
| Marlborough, MA | 58,965 |
| Monterrey, MX | 266,381 |
| Northborough, MA | 56,650 |
| Pawtucket, RI | 46,400 |
| Statesboro, GA | 58,716 |

Item 3. LEGAL PROCEEDINGS

Patent Enforcement Actions Initiated by Aspen

- On January 28, 2021, a search order was executed and relevant evidence secured at the principal places of business of AMA S.p.A. and AMA Composites S.r.l. (collectively, AMA) in San Martino in Rio and Campogalliano, respectively, based on an ex-parte search order issued by the Court of Genoa, Italy at our request in connection with alleged infringement of the Italian part of our patents previously asserted successfully against Nano and Alison in Germany. The Court of Genoa subsequently held a hearing and confirmed the validity of the search order and its execution. While the search proceedings do not take a position on the infringement issues, we may use any evidence collected during the search proceedings to prove infringement. As a result, on May 3, 2021, we filed an infringement complaint, a writ of summons, as known in Italy, at the Court of Genoa alleging that AMA has infringed the Italian part of three European patents (same patents asserted in the German litigation) and a patent on composition of aerogel-based composites in connection with AMA's resale of aerogel products supplied by Chinese companies and sale of any products derived therefrom. We are seeking monetary damages and preliminary injunction of AMA's alleged infringing activities. We issued a press release on May 6, 2021 describing the patent enforcement action of May 3, 2021, or the Press Release. On June 7, 2021, AMA served us a copy of a request it previously filed with the Court of Genoa seeking an ex-parte preliminary injunction, or PI, against us alleging the Press Release constituted anti-competitive conduct and that it infringed AMA's trademark rights. The service of the request followed the court's prior denial of the ex-parte order and an order requiring AMA to serve the request on us. The court subsequently conducted an oral hearing on June 15, 2021. On June 24, 2021, the court denied AMA's request for a PI, reasoning that our Press Release was factually accurate, was not misleading, distinguished facts from opinions and that it was neither anti-competitive nor did it infringe trademark rights of AMA. The Court also ordered AMA to pay certain of our legal fees. On July 5, 2021, AMA informed us that it has decided not to appeal the denial of June 24, 2021. We subsequently learned that AMA had also made a

criminal complaint against our chief executive officer for defamation in connection with the Press Release. On December 31, 2021, the local prosecutor, after reviewing the underlying facts, rejected AMA's arguments and requested the judge overseeing the matter to dismiss the complaint against our chief executive officer, which the judge did in April 2022. In November 2022, we learned that AMA had filed a second criminal complaint in a different jurisdiction in Italy. The second criminal complaint contains the same allegations based on the same underlying facts as the first, however; the judge in this jurisdiction has ordered the local prosecutor to carry out additional investigations and to identify the address of our chief executive officer for service. In March 2023, we learned the prosecutor requested dismissal of the second criminal complaint. In June 2023, we learned the judge formally dismissed the second criminal complaint. In response to our infringement complaint, AMA also added as a counterclaim in connection with its claims regarding the Press Release, those same claims that it previously sought a preliminary injunction, which was denied by the court. On April 15, 2022, the judge in the infringement case appointed two technical experts to provide a technical assessment of validity and infringement. On December 31, 2022, we and AMA each filed the first technical briefs to the experts detailing our positions on validity and infringement. In January and February 2023, we and AMA each filed second and third technical briefs to the experts addressing further arguments on validity and infringement. In May 2023, the technical experts issued their preliminary report on validity and infringement in which they found that two of the asserted manufacturing patents were valid and that the third would be valid with a minor correction. The experts also found that two of the manufacturing patents were infringed by AMA products purchased from Nano Tech Co., Ltd. but that the scope of the composition patent was limited such that AMA's products did not infringe the claims. In June 2023, we and AMA each filed observations on the preliminary report from the technical experts. In July 2023, the experts filed their final report, which confirmed the conclusions from their preliminary report. On July 26, 2023, we filed a motion for preliminary injunction requesting the court to enjoin AMA's sale of infringing aerogel products supplied by Nano Tech Co. Ltd. During September 2023, we and AMA submitted technical briefs regarding our motion for preliminary injunction. On October 27, 2023, the judge issued an order dismissing our motion. On November 7, 2023, we appealed the judge's decision to a panel of the Court of Genoa and a hearing was held on November 29, 2023. As of December 31, 2023, the main patent infringement proceedings are ongoing, and the appeal decision is pending.

- On April 18, 2023, we filed a patent infringement complaint at the Seoul Central District Court and a petition for investigation of unfair trade practices in the Korea Trade Commission (KTC). The complaint and petition alleged that Beerenberg Services AS, Beerenberg Korea Ltd., and Bronx (China) Co., Ltd. have infringed several of our Korean patents in connection with the import and sale of certain aerogel products in Korea. The asserted patents include (a) Korean patents related to high performance reinforced aerogel compositions and (b) Korean counterparts of the patents previously successfully asserted against Nano Tech Co., Ltd. and Guangdong Alison Hi Tech., Ltd. in Germany and the US. We are seeking injunctive relief and monetary damages against the defendants. On May 30, 2023, we learned of a decision by the KTC to institute an investigation against Beerenberg Korea Ltd. and Bronx (China) Co., Ltd. on the basis of our petition. On August 4, 2023, Beerenberg Korea Ltd. and Bronx (China) Co., Ltd. submitted answers to our petition in which they confirmed that the accused infringing products are manufactured in China by Bronx (China) Co., Ltd. and imported into Korea by Beerenberg Korea Ltd. On August 17, 2023, we submitted responses to the answers from Beerenberg and Bronx. From September through November, the parties submitted opinions regarding validity and infringement to the KTC. As of December 31, 2023, the KTC proceedings are ongoing, and there have been no substantive activities in the District Court case.

Other Litigation Matters

In October 2022, we were served with a summons from Aerogels Poland Nanotechnology LLC ("APN"), a former distributor of our products in Poland with whom we previously terminated our distribution agreements because of APN's failure to pay amounts due to us. The summons asserts causes of action for declaratory judgment, breach of contract, breach of implied contract, equitable estoppel and fraud, and states that plaintiffs will seek declaratory judgment, actual and liquidated damages in the sum of \$20 million, in addition to attorneys' fees. We were not served with any complaint at the time the summons was served. In December 2022, we filed a notice of appearance in New York County Supreme Court and a demand upon plaintiffs to file and serve a complaint. In March 2023, plaintiffs filed a complaint asserting various causes of action consistent with those set forth in the October 2022 summons, and a demand for monetary damages and other relief in excess of \$16 million. In July 2023, we filed a motion to compel arbitration, and in February 2024, the Court granted our motion and stayed the litigation pending arbitration. To the extent APN seeks to pursue claims in an arbitration proceeding, Aspen intends to continue to vigorously defend this matter, including seeking its legal costs.

Due to their nature, it is difficult to predict the outcome or the costs involved in any litigation or administrative proceedings, including any appeals process. Furthermore, the counterparties in these proceedings may have significant resources and interest to litigate and therefore, these litigation matters could be protracted and may ultimately involve significant legal expenses.

In addition to the foregoing, we have been and may be from time to time a party to other legal proceedings that arise in the ordinary course of business and to other patent enforcement actions to assert our patent rights.

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 and Dividend Policy

Our common stock is trading on The New York Stock Exchange, or NYSE, under the symbol "ASPN." As of March 5, 2024, there were approximately 42 stockholders of record of our common stock.

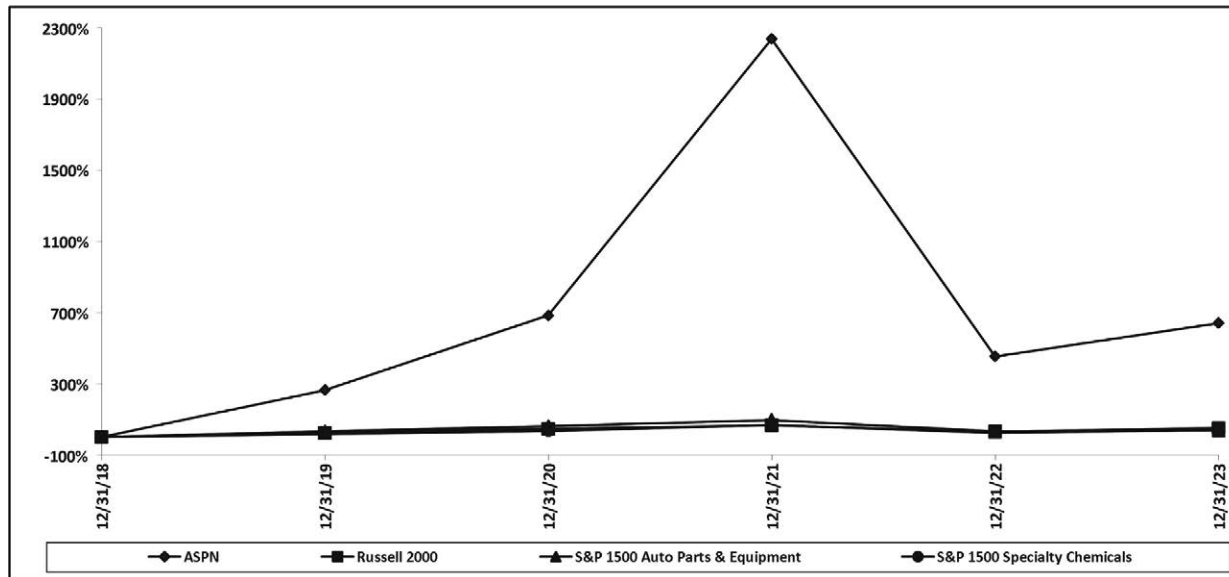
Dividends

We have not paid dividends to our stockholders since our inception, and we do not plan to pay cash dividends in the foreseeable future. We currently intend to retain earnings, if any, to finance the development and expansion of our business.

Stock Performance Graph

This performance graph is not "soliciting material," is not deemed filed with the SEC and is not to be incorporated by reference in any filing by us under the Securities Act of 1933 or the Securities Exchange Act of 1934, as amended, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing. The stock price performance shown on the graph is not necessarily indicative of future price performance.

Comparison of Cumulative Total Return



Unregistered Sales of Equity Securities and Use of Proceeds

- (a) *Unregistered Sales of Equity Securities.* Not applicable.
- (b) *Use of Proceeds from Initial Public Offering of Common Stock.* Not applicable.
- (c) *Purchases of Equity Securities By the Issuer and Affiliated Purchasers.* We did not repurchase any of our equity securities during the year ended December 31, 2023.

Item 6. [RESERVED]

Item 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion of our financial condition and results of operations should be read in conjunction with our consolidated financial statements and the related notes thereto included in this Annual Report on Form 10-K. In addition to historical information, some of the information contained in the following discussion and analysis or set forth elsewhere in this report, including information with respect to our plans and strategy for our business, includes forward-looking information that involves risks, uncertainties and assumptions. You should read the Risk Factors set forth in Item 1A of this Annual Report on Form 10-K for a discussion of important factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis. Our actual results and the timing of events could differ materially from those anticipated by these forward looking statements.

Investors and others should note that we routinely use the Investors section of our website to announce material information to investors and the marketplace. While not all of the information that we post on the Investors section of our website is of a material nature, some information could be deemed to be material. Accordingly, we encourage investors, the media, and others interested in us to review the information that we share on the Investors section of our website, <https://www.aerogel.com/>.

Products

Our core businesses are organized into two reportable segments: Energy Industrial and Thermal Barrier. The following describes our key product offerings and new product innovations by reportable segment.

Energy Industrial

We design, develop and manufacture innovative, high-performance aerogel insulation used primarily in the energy industrial and sustainable insulation materials markets. We believe our aerogel blankets deliver the best thermal performance of any widely used insulation product available on the market today and provide a combination of performance attributes unmatched by traditional insulation materials. Our end-user customers select our products where thermal performance is critical and to save money, improve resource efficiency, enhance sustainability, preserve operating assets and protect workers. Our insulation is used by oil producers and the owners and operators of refineries, petrochemical plants, LNG facilities, power generating assets and other energy industrial. Our Pyrogel® and Cryogel® product lines have undergone rigorous technical validation by industry leading end-users and achieved significant market adoption.

We also derive revenue from a number of other end markets. Customers in these markets use our products for applications as diverse as military and commercial aircraft, trains, buses, appliances, apparel, footwear and outdoor gear. As we continue to enhance our Aerogel Technology Platform, we believe we will have additional opportunities to address high-value applications in the global insulation market, and in a number of new, high-value markets, including hydrogen energy, filtration, water purification, and gas sorption.

We market and sell our products primarily through a sales force based in North America, Europe and Asia. The efforts of our sales force are supported by a small number of sales consultants with extensive knowledge of a particular market or region. Our sales force is responsible for establishing and maintaining customer and partner relationships, delivering highly technical information and ensuring high-quality customer service.

Our salespeople work directly with end-user customers and engineering firms to promote the qualification, specification and acceptance of our aerogel and thermal barrier products. We also rely on an existing and well-established channel of qualified insulation distributors and contractors in more than 50 countries around the world to ensure rapid delivery of our aerogel products and strong end-user support.

Thermal Barrier

We are also actively developing a number of promising aerogel products and technologies for the EV market. We have developed and are commercializing our proprietary line of PyroThin® aerogel thermal barriers for use in battery packs in EVs. Our PyroThin product is an ultra-thin, lightweight and flexible thermal barrier designed with other functional layers to impede the propagation of thermal runaway across multiple lithium-ion battery system architectures. Our thermal barrier technology is designed to offer a unique combination of thermal management, mechanical performance and fire protection properties. These properties enable EV manufacturers to achieve critical battery performance and safety goals. In addition, we are seeking to leverage our patented carbon aerogel technology to develop industry-leading battery materials for use in lithium-ion battery cells. These battery materials have the potential to increase the energy density of the battery cells, thus enabling an increase in the driving range of EVs.

The commercial potential for our PyroThin thermal barriers and our carbon aerogel battery materials in the EV market is significant. Accordingly, we are hiring additional personnel, incurring additional operating expenses, incurring significant capital expenditures to expand aerogel manufacturing capacity, establishing an automated thermal barrier fabrication operation, enhancing research and development resources and expanding our battery material research facilities, among other items.

We have entered into production contracts with certain major OEMs, including General Motors LLC, or GM, to supply fabricated, multi-part thermal barriers for use in the battery system of its next-generation EVs. Pursuant to the contracts with GM, we are obligated to supply the barriers at fixed annual prices and at volumes to be specified by the customer up to a daily maximum quantity through the term of the agreements, which expire at various times from 2026 through 2034. While GM has agreed to purchase its requirement for the barriers from us at locations to be designated from time to time, it has no obligation to purchase any minimum quantity of barriers under the contracts. In addition, GM may terminate the contracts any time and for any or no reason. All other terms of the contracts are generally consistent with GM's standard purchase terms, including quality and warranty provisions customary in the automotive industry. We have also entered into production contracts with Toyota, Scania, ACC, a battery cell joint venture between Stellantis N.V, Saft-TotalEnergies and Mercedes-Benz, and Audi, a luxury brand of the Volkswagen Group.

Manufacturing Operations

We manufacture our products using our proprietary technology at our facility in East Providence, Rhode Island. We have operated the East Providence facility since 2008 and have increased our capacity in phases. To meet expected growth in demand for our aerogel products in the EV market, we have been in the process of expanding our aerogel blanket capacity by constructing a second manufacturing plant in Bulloch County, Georgia. However, in order to manage the development of the second plant so that its increased capacity comes online in a manner that aligns with our current expectations as to demand from our EV customers, we are extending the timeframe for construction and commissioning of the second plant until such time as its capacity is supported by increased demand. In the meantime, and until we ramp up construction, we expect to be able to substantially reduce our planned capital expenditures for 2024. At the same time, we believe that productivity improvements in our existing Rhode Island facility combined with the supplemental supply of our energy industrial products from one or more external manufacturing facilities in China will permit us to achieve a target revenue capacity of approximately \$650 million in 2024 and prior to the completion and start-up of the second plant. Nonetheless, there can be no assurance as to when we will ramp up construction on the second plant. There can also be no assurance that our contract manufacturing strategy of meeting the demand of our energy industrial customers with supply from one or more external manufacturing facilities in China will provide us with adequate manufacturing capacity or supply for that expected demand. Furthermore, when we ramp up construction on the second plant, further cost inflation and/or supply chain disruptions, as well as potential changes in the scope of the facilities, could lead to increases to our prior estimated costs for completion of the second plant. In 2023, we opened our 59,000-square-foot engineering and rapid prototyping facility in Marlborough, MA. Our Advanced Thermal Barrier Center (ATBC) is designed to be the engineering hub of PyroThin cell-to-cell barriers, which help manufacturers optimize the safety and performance of battery packs for eMobility and energy storage system (ESS) markets.

Recent Developments

On September 28, 2023 (the "First Amendment Effective Date"), Aspen Aerogels Georgia, LLC, a Georgia limited liability company (the "Borrower"), our wholly-owned subsidiary, entered into a first amendment (the "First Amendment") to amend that certain loan agreement, dated as of November 28, 2022 (the "Loan Agreement"), by and among (i) the Borrower, (ii) us, as a guarantor and (iii) Aspen Aerogels Rhode Island, LLC, a Rhode Island limited liability company ("Aspen RI" and, together with the Borrower and us, each, a "Loan Party" and collectively, the "Loan Parties"), as a guarantor, and (iv) General Motors Holdings LLC ("GM"), as lender.

Pursuant to the First Amendment, the Loan Parties and GM agreed to, among other things, (i) extend the draw period for the delayed draw senior secured term loans (the "Loan"), from beginning on January 1, 2023 and ending on September 30, 2023, to instead a period beginning on the date that is twelve (12) months prior to the date agreed upon by Borrower and GM for the start of production at an aerogel manufacturing facility in Bulloch County, Georgia (the "Plant") under the applicable GM Purchase Contracts (as defined therein) and ending on March 31, 2024 (or any later date approved in writing by GM at its sole discretion); (ii) extend the maturity date of the Loan Agreement from March 31, 2025 to September 30, 2025; and (iii) add the following financial covenants measured starting from the fiscal quarter ending December 31, 2024 and at the end of each fiscal quarter thereafter (each such fiscal quarter end, a "Test Date"): (A) a covenant requiring that the Total Leverage Ratio (as defined therein) shall not exceed 5.00:1.00 as of the applicable Test Date and (B) a covenant requiring that the ratio of our total indebtedness and our subsidiaries (with certain exceptions) to our consolidated equity shall not be greater than 1.20x as of the applicable Test Date, in each case, with compliance demonstrated through the submission of a certain compliance certificate (the "Financial Covenants"), subject to customary equity cure rights with respect to the Financial Covenants.

The First Amendment also amended the conditions precedent to funding to (i) require the Borrower to provide evidence that cash proceeds of one or more equity and/or debt financing arrangements of not less than \$500.0 million in the aggregate (inclusive of all equity investments contributed to the Borrower for use in connection with the Plant prior to the First Amendment Effective Date) have been contributed to and disbursed by the Borrower in the manner prescribed in a pre-determined project budget (subject to a permitted variance) to fund the construction of and equipment for the first phase of the Plant and (ii) require that 70% of the total cost in connection with the construction and operation of the Plant has been fully funded prior to such applicable borrowing under the Loan Agreement.

Financial Summary

On November 5, 2020, we entered into a sales agreement for an at-the-market (“ATM”) offering program with B. Riley Securities as our sales agent. During the year ended December 31, 2021, we sold 929,981 shares of our common stock through the ATM offering program with B. Riley Securities and received net proceeds of \$19.4 million. On March 16, 2022, we entered into a sales agreement for an ATM offering program with Cowen and Company, LLC and Piper Sandler & Co., as our sales agents, or the 2022 ATM offering program. During the year ended December 31, 2022, we sold 5,241,400 shares of our common stock through the 2022 ATM offering program and received net proceeds of \$72.7 million. The 2022 ATM offering program was terminated on June 20, 2023.

On February 3, 2021, we entered into a supply agreement with Silbond Corporation for the purchase of certain silanes products. Pursuant to the agreement, we agreed to purchase, and Silbond agreed to supply, all of our requirements for the specified silanes at our East Providence facility through the term of the agreement on September 30, 2023, unless either party terminates the agreement earlier pursuant to its terms. In October 2022, we extended the agreement through December 31, 2023, and the agreement has subsequently terminated.

On June 29, 2021, we sold 3,462,124 shares to an affiliate of Koch, in a private placement of our common stock and received net proceeds of \$73.5 million after deducting fees and offering expenses of \$1.5 million. On March 28, 2022, we sold to an affiliate of Koch, 1,791,986 shares of our common stock for aggregate gross proceeds of \$50.0 million, pursuant to a securities purchase agreement, dated as of February 15, 2022, by and between us and the affiliate of Koch.

On February 18, 2022, we sold and issued to an affiliate of Koch \$100.0 million in aggregate principal amount of our Convertible Senior PIK Toggle Notes due 2027, or the Notes, pursuant to a note purchase agreement, dated as of February 15, 2022, by and between us and the affiliate of Koch. The Notes bear interest at the Secured Overnight Financing Rate, or SOFR, plus 5.50% per annum if interest is paid in cash, or the Cash Interest, or, if interest is paid in kind (through an increase in the principal amount of the outstanding Notes or through the issuance of additional Notes), at SOFR plus 6.50% per annum, or PIK Interest. Under the terms of the investment, SOFR has a floor of 1% and a cap of 3%. We can elect to make any interest payment through Cash Interest, PIK Interest or any combination thereof. Interest on the Notes is payable semi-annually in arrears on June 30 and December 30, commencing on June 30, 2022. It is expected that the Notes will mature on February 18, 2027, subject to earlier conversion, redemption or repurchase. On November 28, 2022, in connection with the Loan Agreement (described below) we entered into an amendment to the Notes, or the Convertible Note Amendment, to reduce the initial Conversion Price (as defined in the Notes) by \$5.00 per share from \$34.936625 per share to \$29.936625 per share, by increasing the initial Conversion Rate (as defined in the Notes) from 28.623257 shares per \$1,000 of Capitalized Principal Amount (as defined in the Notes) to 33.400100 shares per \$1,000 of Capitalized Principal Amount under the Notes.

On November 28, 2022, our wholly owned subsidiary, Aspen Aerogels Georgia, LLC, or the Borrower, entered into the Loan Agreement, by and between (i) the Borrower, (ii) Aspen Aerogels, Inc. and (iii) Aspen RI, and, together with the Borrower and Aspen Aerogels, Inc., each, a Loan Party and collectively, the Loan Parties), as guarantors, and (iv) GM, as lender. The Borrower is required to use the proceeds of the Loan in connection with the construction and operation of our planned aerogel manufacturing facility in Bulloch County, Georgia. The Loan Agreement provides for a multi-draw senior secured term loan in an aggregate principal amount of up to \$100.0 million, or the Loan, available to the Borrower to draw on a delayed draw basis after January 1, 2023 to September 30, 2023, subject to certain conditions precedent to funding. The interest rate on the Loan is equal to the term Secured Overnight Financing Rate published by CME Group Benchmark Administration Limited for a six-month interest period, or Term SOFR, plus 8.0% per year, subject to a term SOFR floor of 1.0%, or the Floor, with a maturity date of the earlier of (i) March 31, 2025 and (ii) 90 days prior to the maturity date of any other debt facility to which the Loan Parties may be a party (other than any revolving loan agreement), or the Maturity Date. At the Borrower’s election and prior to the issuance of a certificate of occupancy for the Plant, interest may be paid-in-kind at a rate equal to Term SOFR (subject to the Floor) plus 9.0% per year. Refer to Recent Developments for details of the amendment to the Loan Agreement.

On November 29, 2022, we completed an underwritten public offering of 29,052,631 shares of our common stock at a public offering price of \$9.50 per share. We received net proceeds of \$267.5 million after deducting underwriting discounts and commissions of \$8.1 million and offering expenses of approximately \$0.5 million.

On November 28, 2022, we terminated the Amended and Restated Loan and Security Agreement, or the SVB Loan Agreement, with Silicon Valley Bank, or SVB. As of the date of termination, we had no amounts due or owed to SVB under the SVB Loan Agreement for any principal, interest, or other amounts, other than approximately \$1.2 million in letters of credit that were issued under the SVB Loan Agreement and will be cash collateralized in connection with the termination of the SVB Loan Agreement.

In December 2023, we sold 6,060,607 shares of our common stock at an offering price of \$12.38 per share in a registered direct offering for net proceeds of \$74.4 million, after deducting offering expenses of approximately \$0.6 million.

Key Metrics and Non-GAAP Financial Measures

We regularly review a number of metrics, including the following key metrics, to evaluate our business, measure our performance, identify trends affecting our business, formulate financial projections and make strategic decisions.

Square Foot Operating Metric

We price our energy industrial product and measure our shipments in square feet. We believe the square foot operating metric allows us and our investors to measure our manufacturing capacity and energy industrial product shipments on a uniform and consistent basis. The following chart sets forth energy industrial product shipments in square feet associated with recognized revenue, including revenue recognized over time, for the periods presented:

| | Year Ended December 31, | | |
|----------------------------------|----------------------------|--------|--------|
| | 2023 | 2022 | 2021 |
| | (Square feet in thousands) | | |
| Product shipments in square feet | 28,392 | 32,589 | 34,557 |

Adjusted EBITDA

We use Adjusted EBITDA, a non-GAAP financial measure, as a means to assess our operating performance. We define Adjusted EBITDA as net income (loss) before interest expense, taxes, depreciation, amortization, stock-based compensation expense and other items, from time to time, which we do not believe are indicative of our core operating performance, which in 2021 included a gain on the extinguishment of debt. Adjusted EBITDA is a supplemental measure of our performance that is not presented in accordance with U.S. GAAP. Adjusted EBITDA should not be considered as an alternative to net income (loss) or any other measure of financial performance calculated and presented in accordance with U.S. GAAP. In addition, our definition and presentation of Adjusted EBITDA may not be comparable to similarly titled measures presented by other companies.

We use Adjusted EBITDA:

- as a measure of operating performance because it does not include the impact of items that we do not consider indicative of our core operating performance;
- for planning purposes, including the preparation of our annual operating budget;
- to allocate resources to enhance the financial performance of our business; and
- as a performance measure used under our bonus plan.

We also believe that the presentation of Adjusted EBITDA provides useful information to investors with respect to our results of operations and in assessing the performance and value of our business. Various measures of EBITDA are widely used by investors to measure a company's operating performance without regard to items that can vary substantially from company to company depending upon financing and accounting methods, book values of assets, capital structures and the methods by which assets were acquired.

Although measures similar to Adjusted EBITDA are frequently used by investors and securities analysts in their evaluation of companies, we understand that Adjusted EBITDA has limitations as an analytical tool, and you should not consider it in isolation or as a substitute for net income (loss), income (loss) from operations, net cash provided by (used in) operating activities or an analysis of our results of operations as reported under U.S. GAAP. Some of these limitations are:

- Adjusted EBITDA does not reflect our historical cash expenditures or future requirements for capital expenditures or other contractual commitments;
- Adjusted EBITDA does not reflect changes in, or cash requirements for, our working capital needs;
- Adjusted EBITDA does not reflect stock-based compensation expense;

- Adjusted EBITDA does not reflect our income tax expense or cash requirements to pay our income taxes;
- Adjusted EBITDA does not reflect our interest expense, or the cash requirements necessary to service interest or principal payments on our debt;
- although depreciation, amortization and impairment charges are non-cash charges, the assets being depreciated, amortized or impaired will often have to be replaced in the future, and Adjusted EBITDA does not reflect any cash requirements for these replacements; and
- other companies in our industry may calculate EBITDA or Adjusted EBITDA differently than we do, limiting their usefulness as a comparative measure.

Because of these limitations, our Adjusted EBITDA should not be considered as a measure of discretionary cash available to us to reinvest in the growth of our business or as a measure of cash available for us to meet our obligations.

To properly and prudently evaluate our business, we encourage you to review the U.S. GAAP financial statements included elsewhere in this Annual Report on Form 10-K, and not to rely on any single financial measure to evaluate our business.

The following table presents a reconciliation of net loss, the most directly comparable U.S. GAAP measure, to Adjusted EBITDA for the years presented:

| | Year Ended December 31, | | |
|---|-------------------------|--------------------|--------------------|
| | 2023 | 2022 | 2021 |
| | (\$ in thousands) | | |
| Net loss | \$ (45,811) | \$ (82,738) | \$ (37,094) |
| Depreciation and amortization | 15,318 | 9,222 | 9,440 |
| Stock-based compensation ⁽¹⁾ | 10,954 | 9,385 | 5,176 |
| Gain on the extinguishment of debt | — | — | (3,734) |
| Other (income) expense | (3,392) | 3,493 | 229 |
| Adjusted EBITDA | <u>\$ (22,931)</u> | <u>\$ (60,638)</u> | <u>\$ (25,983)</u> |

- (1) Represents non-cash stock-based compensation related to vesting and modifications of stock option grants, vesting of restricted stock units and vesting and modification of restricted common stock.

The following table presents a reconciliation of net loss, the most directly comparable U.S. GAAP measure, to Adjusted EBITDA for the quarters presented:

| | Three Months Ended | | | | Three Months Ended | | | |
|---|--------------------|--------------------|-------------------|-----------------|--------------------|--------------------|--------------------|-------------------|
| | 2023 | | | | 2022 | | | |
| | March 31 | June 30 | Sept. 30 | Dec. 31 | March 31 | June 30 | Sept. 30 | Dec. 31 |
| | (\$ in thousands) | | | | | | | |
| Net loss | \$ (16,796) | \$ (15,423) | \$ (13,073) | \$ (519) | \$ (19,484) | \$ (24,050) | \$ (29,595) | \$ (9,609) |
| Depreciation and amortization | 2,704 | 3,503 | 4,550 | 4,561 | 2,129 | 2,032 | 2,531 | 2,530 |
| Stock-based compensation ⁽¹⁾ | 2,267 | 2,710 | 2,789 | 3,188 | 1,828 | 2,295 | 2,590 | 2,672 |
| Other (income) expense | (2,112) | (1,621) | (1,561) | 1,902 | 860 | 1,404 | 1,286 | (57) |
| Adjusted EBITDA | <u>\$ (13,937)</u> | <u>\$ (10,831)</u> | <u>\$ (7,295)</u> | <u>\$ 9,132</u> | <u>\$ (14,667)</u> | <u>\$ (18,319)</u> | <u>\$ (23,188)</u> | <u>\$ (4,464)</u> |

- (1) Represents non-cash stock-based compensation related to vesting and modifications of stock option grants, vesting of restricted stock units and vesting and modification of restricted common stock.

Our financial performance, including such measures as net income (loss), earnings per share and Adjusted EBITDA, are affected by a number of factors including volume and mix of aerogel products sold, average selling prices, our material costs and manufacturing expenses, the costs associated with capacity expansions and start-up of additional production capacity, and the amount and timing of operating expenses. Accordingly, we expect that our net income (loss), earnings per share and Adjusted EBITDA will vary from period to period.

During 2023, we experienced strong volume growth in our thermal barrier products. As a result, we experienced total revenue growth of 32% during the year. We increased staffing and spending levels in support of the growing demand for our thermal barrier business and our carbon aerogel battery material opportunity in coming years. We also increased staffing and spending to expand and defend our IP portfolio, and to enhance our general and administrative functions to manage the anticipated strong growth in our business.

We expect to maintain strong revenue growth during 2024 driven by accelerating demand in the EV market and continued market share gains in the sustainable insulation materials market. Our expectation to maintain strong revenue growth is based, in part, on our OEM customers' production volume forecasts and targets as well as our expectation to successfully scale our manufacturing capabilities and address any potential supply chain issues to meet this expected demand. As a result, we expect to experience a decrease in both net loss and negative Adjusted EBITDA during 2024.

We also expect to incur reduced capital expenditures and expenses during 2024 related to our planned second aerogel manufacturing facility to be located in Bulloch County, Georgia. We may, from time to time, enter into leasing arrangements including sale and leaseback financing arrangements. In January 2024, we entered into a sale and leaseback arrangement, pursuant to which we sold certain equipment to an equipment leasing company (the "Leasing Company") for a one-time cash payment of \$5.0 million and leased back such equipment from the Leasing Company. The associated monthly lease rents will be paid over the term of three years. We intend to continue evaluating certain assets for potential sale and lease back arrangements in the future. This type of arrangement would provide us with one-time cash payments in the near term, in exchange for future lease payments.

Revenue

We recognize revenue from the sale of our energy industrial aerogel products and thermal barriers. Revenue is recognized upon the satisfaction of contractual performance obligations.

We record deferred revenue for product sales when (i) we have delivered products but other revenue recognition criteria have not been satisfied or (ii) payments have been received in advance of the completion of required performance obligations.

The following table sets forth the total revenue for the periods presented:

| | Year Ended December 31, | | |
|-------------------|----------------------------|-------------------|-------------------|
| | 2023 | 2022 | 2021 |
| | (\$ in thousands) | | |
| Revenue: | | | |
| Energy industrial | \$ 128,639 | \$ 124,807 | \$ 114,958 |
| Thermal barrier | 110,079 | 55,557 | 6,664 |
| Total | <u>\$ 238,718</u> | <u>\$ 180,364</u> | <u>\$ 121,622</u> |

Energy industrial revenue accounted for 54%, 69%, and greater than 95% of total revenue for the years ended December 31, 2023, 2022 and 2021, respectively. We experienced a 32% increase in total revenue during 2023 driven by the increase in our energy industrial business, particularly in Europe, and continued growth in the EV market.

We project revenue growth during 2024 due to accelerating demand in the EV market and continued market share gains in the sustainable insulation materials market.

A substantial majority of our revenue is generated from a limited number of direct customers, including distributors, contractors, fabricators, OEMs, partners and end-user customers. Our ten largest customers accounted for approximately 80% of our total revenue during the year ended December 31, 2023, and we expect that most of our revenue will continue to come from a relatively small number of customers for the foreseeable future.

In 2023, sales to GM and Distribution International, Inc. represented 41% and 14% of our total revenue, respectively. In 2022, sales to GM and Distribution International, Inc. represented 25% and 22% of our total revenue, respectively. In 2021, sales to Distribution International, Inc. represented 28% of our total revenue. For each of the noted periods, there were no other customers that represented 10% or more of our total revenues.

We conduct business across the globe and a substantial portion of our revenue is generated outside of the United States. Total revenue from outside of the United States, based on shipment destination, amounted to \$87.7 million, or 37% of our total revenue, \$66.4 million, or 37% of our total revenue, and \$54.8 million, or 45% of our total revenue, in the years ended December 31, 2023, 2022 and 2021, respectively.

Cost of Revenue

Cost of product revenue consists primarily of materials and manufacturing expense. Cost of product revenue is recorded when the related product revenue is recognized.

Material is a significant component of cost of product revenue and includes fibrous batting, silica materials and additives. Material costs as a percentage of product revenue were 36%, 51% and 48% for the years ended December 31, 2023, 2022 and 2021, respectively. Material costs as a percentage of product revenue vary from product to product due to differences in average selling prices, material requirements, product thicknesses, and manufacturing yields. In addition, we provide warranties for our products and record the estimated cost within cost of revenue in the period that the related revenue is recorded or when we become aware that a potential warranty claim is probable and can be reasonably estimated. As a result of these factors, material costs as a percentage of product revenue will vary from period to period due to changes in the mix of aerogel products sold, the costs of our raw materials or the estimated cost of warranties. In addition, global supply chain disturbances, increased reliance on foreign materials procurement, industrial gas supply constraints, increases in the cost of our raw materials, engineering changes, higher prototype sales and other factors may significantly impact our material costs and have a material impact on our operations. We expect that material costs will increase in absolute dollars during 2024 due to projected growth in product shipments and contracts but remain stable as a percentage of revenue due to improved manufacturing, and fabrication yields and a favorable mix of products sold.

Manufacturing expense is also a significant component of cost of revenue. Manufacturing expense includes labor, utilities, maintenance expense, and depreciation on manufacturing assets. Manufacturing expense also includes stock-based compensation of manufacturing employees and shipping costs. Manufacturing expense as a percentage of product revenue was 40%, 46% and 44% for the years ended December 31, 2023, 2022 and 2021, respectively. We expect that manufacturing expense will increase in absolute dollars and decrease as a percentage of revenue during 2024 due to increased staffing and spending levels in support of our thermal barrier business, including the operation of an automated fabrication facility in Monterrey, Mexico. We are also continuing to monitor the impact of engaging one or more external manufacturing facilities in China to supply our aerogel products for the energy industrial market beginning in 2024 on our manufacturing expense and cost of product revenue.

During 2024, we expect that cost of product revenue will increase in absolute dollars due to projected volume growth and a planned increase in staffing and spending levels, but decrease as a percentage of product revenue due to projected increases in average selling prices, improved manufacturing and fabrication yields and a favorable mix of products sold.

Gross Profit

Our gross profit as a percentage of revenue is affected by a number of factors, including the volume of products produced and sold, the mix of products sold, average selling prices, our material and manufacturing costs, realized capacity utilization and the costs associated with expansions and start-up of production capacity. Accordingly, we expect our gross profit to vary significantly in absolute dollars and as a percentage of revenue from period to period. Gross profit as a percentage of total revenue was 24%, 3%, and 8% for the years ended December 31, 2023, 2022 and 2021, respectively.

During 2024, we expect gross profit to increase in both absolute dollars and as a percentage of total revenue due to the combination of a projected increase in total revenue combined with projected reduction in material costs and manufacturing expense as a percentage of total revenue.

In the longer term, we expect gross profit to improve in absolute dollars and as a percentage of revenue due to expected increases in total revenue, production volumes and manufacturing productivity. In addition, we expect the gross profit improvement derived from the increases in revenue, volume and productivity will be supported by the continued implementation of lower cost product formulations and realization of material purchasing efficiencies.

Operating Expenses

Operating expenses consist of research and development, sales and marketing, and general and administrative expenses. Operating expenses include personnel costs, legal fees, professional fees, service fees, insurance premiums, travel expense, facilities related costs and other costs, expenses and fees. The largest component of our operating expenses is personnel costs, consisting of salaries, benefits, incentive compensation and stock-based compensation. In any particular period, the timing and extent of personnel additions or reductions, legal activities, including patent enforcement actions, marketing programs, research efforts and a range of similar activities or actions could materially affect our operating expenses, both in absolute dollars and as a percentage of revenue.

Research and Development Expenses

Research and development expenses consist primarily of expenses for personnel engaged in the development of next generation aerogel compositions, form factors and manufacturing technologies. These expenses also include testing services, prototype expenses, consulting services, trial formulations for new products, equipment depreciation, facilities costs and related overhead. We expense research and development costs as incurred. We expect to continue to devote substantial resources to the development of new aerogel technologies, including our carbon aerogel battery materials. We believe that these investments are necessary to maintain and improve our competitive position. We also expect to continue to invest in research and engineering personnel and the infrastructure required in support of their efforts. We expect our research and development expenses will increase in absolute dollars and decrease as a percentage of revenue in 2024 and the longer term.

Sales and Marketing Expenses

Sales and marketing expenses consist primarily of personnel costs, incentive compensation, marketing programs, travel and related costs, consulting expenses and facilities related costs. We expect our sales and marketing expenses will increase in absolute dollars but decrease as a percentage of revenue in 2024 and in the longer term.

General and Administrative Expenses

General and administrative expenses consist primarily of personnel costs, legal expenses, consulting and professional services, audit fees, compliance with securities, corporate governance and related laws and regulations, investor relations and insurance premiums, including director and officer insurance. We expect our general and administrative expenses to increase as we add general and administrative personnel to support the anticipated growth of our business. We also expect that the patent enforcement actions, described in more detail under “Legal Proceedings” in Part I, Item 3 of this Annual Report on Form 10-K, if protracted, could result in significant legal expense over the medium to long-term. We expect that our general and administrative expenses will increase in absolute dollars and decrease as a percentage of revenue.

Interest Expense, Convertible Note - Related Party

Interest expense, convertible note - related party is net of the capitalized interest related to the \$100.0 million in aggregate principal amount of our Convertible Senior PIK Toggle Notes.

Other Income (Expense), Net

For the years ended December 31, 2023, 2022 and 2021, interest expense, net consists of interest expense related to our revolving credit facility and in 2022 and 2023, included interest earned on the cash balances invested in deposit accounts, money market accounts, and high-quality debt securities issued by the U.S. government.

Gain on Extinguishment of Debt

On May 1, 2020, our wholly-owned subsidiary, Aspen Aerogels Rhode Island, LLC, executed a note for an unsecured PPP loan of \$3.7 million pursuant to the CARES Act. On August 24, 2021, the SBA remitted \$3.7 million in principal and accrued interest to the noteholder after approving the Aspen Aerogels Rhode Island, LLC’s application for forgiveness of the PPP Loan. Accordingly, we recorded a total gain on the extinguishment of debt of \$3.7 million during the year ended December 31, 2021.

Income from Employee Retention Credit

Employee retention credit consists of other income related to our submitted filings for CARES Employee Retention Credits.

Provision for Income Taxes

We have incurred net losses since inception and have not recorded benefit provisions for U.S. federal income taxes or state income taxes since the tax benefits of our net losses have been offset by valuation allowances due to the uncertainty associated with the utilization of net operating loss carryforwards.

At December 31, 2023, we had \$358.9 million of net operating losses available to offset future federal income tax, if any, of which \$194.6 million expire on various dates through December 31, 2038. Net operating losses of \$164.3 million generated from 2018 through 2023 have an unlimited carryforward.

Results of Operations

The following tables set forth our results of operations for the periods presented:

| | Year Ended December 31, | | |
|--|-------------------------|-------------|-------------|
| | 2023 | 2022 | 2021 |
| | (\$ in thousands) | | |
| Revenue | \$ 238,718 | \$ 180,364 | \$ 121,622 |
| Cost of revenue | 181,797 | 175,388 | 111,685 |
| Gross profit | 56,921 | 4,976 | 9,937 |
| Operating expenses | | | |
| Research and development | 16,356 | 16,930 | 11,441 |
| Sales and marketing | 33,008 | 28,792 | 16,581 |
| General and administrative | 56,760 | 38,499 | 22,514 |
| Total operating expenses | 106,124 | 84,221 | 50,536 |
| Loss from operations | (49,203) | (79,245) | (40,599) |
| Other income (expense) | | | |
| Interest expense, convertible note - related party | (5,328) | (5,110) | — |
| Interest income (expense), net | 6,534 | 1,617 | (229) |
| Gain on extinguishment of debt | — | — | 3,734 |
| Income from Employee Retention Credits | 2,186 | — | — |
| Total other income (expense) | 3,392 | (3,493) | 3,505 |
| Net loss | \$ (45,811) | \$ (82,738) | \$ (37,094) |

Year ended December 31, 2023 compared to year ended December 31, 2022

The following tables set forth our results of operations for the periods presented:

| | Year Ended December 31, | | | | Year Ended December 31, | |
|--|-------------------------|-------------|-----------|----------|-------------------------------|--------|
| | 2023 | 2022 | \$ Change | % Change | 2023 | 2022 |
| | (\$ in thousands) | | | | (Percentage of total revenue) | |
| Revenue | \$ 238,718 | \$ 180,364 | \$ 58,354 | 32 % | 100 % | 100 % |
| Cost of revenue | 181,797 | 175,388 | 6,409 | 4 % | 76 % | 97 % |
| Gross profit | 56,921 | 4,976 | 51,945 | 1,044 % | 24 % | 3 % |
| Operating expenses | | | | | | |
| Research and development | 16,356 | 16,930 | (574) | (3) % | 7 % | 9 % |
| Sales and marketing | 33,008 | 28,792 | 4,216 | 15 % | 14 % | 16 % |
| General and administrative | 56,760 | 38,499 | 18,261 | 47 % | 24 % | 21 % |
| Total operating expenses | 106,124 | 84,221 | 21,903 | 26 % | 44 % | 47 % |
| Loss from operations | (49,203) | (79,245) | 30,042 | (38) % | (21) % | (44) % |
| Other income (expense) | | | | | | |
| Interest expense, convertible note - related party | (5,328) | (5,110) | (218) | 100 % | (2) % | -3 % |
| Interest income, net | 6,534 | 1,617 | 4,917 | 304 % | 3 % | 1 % |
| Income from Employee Retention Credits | 2,186 | — | 2,186 | 100 % | 1 % | — % |
| Total other income (expense) | 3,392 | (3,493) | 6,885 | (197) % | 1 % | (2) % |
| Net loss | \$ (45,811) | \$ (82,738) | \$ 36,927 | 45 % | (19) % | (46) % |

Revenue

| | Year Ended December 31, | | | | Change | |
|-------------------|-------------------------|-----------------------|-------------------|-----------------------|------------------|------------|
| | 2023 | | 2022 | | | |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | Amount | Percentage |
| (\$ in thousands) | | | | | | |
| Revenue: | | | | | | |
| Energy industrial | \$ 128,639 | 54% | \$ 124,807 | 69% | \$ 3,832 | 3% |
| Thermal barrier | 110,079 | 46% | 55,557 | 31% | 54,522 | 98% |
| Total revenue | <u>\$ 238,718</u> | <u>100%</u> | <u>\$ 180,364</u> | <u>100%</u> | <u>\$ 58,354</u> | <u>32%</u> |

The following chart sets forth energy industrial product shipments in square feet associated with recognized revenue, including revenue recognized over time, for the periods presented:

| | Year Ended December 31, | | Change | |
|---|-------------------------|--------|---------|------------|
| | 2023 | 2022 | Amount | Percentage |
| Product shipments in square feet (in thousands) | 28,392 | 32,589 | (4,197) | (13)% |

Total revenue increased \$58.3 million, or 32%, to \$238.7 million in 2023 from \$180.4 million in 2022. The increase in total revenue was the result of increases in both energy industrial and thermal barrier revenue.

Energy industrial revenue increased by \$3.8 million, or 3%, to \$128.6 million in 2023 from \$124.8 million in 2022. This increase was driven by a more favorable mix of product shipments in the global petrochemical and refinery markets, particularly in Latin America, project-based demand in the subsea market, offset, in part, by a decrease in maintenance-based demand in the global petrochemical and refinery markets in North America, Europe, and Asia.

Energy industrial revenue for the years ended December 31, 2023 and 2022, included \$33.6 million and \$39.3 million in sales to Distribution International, Inc., respectively. The average selling price per square foot of our products increased by \$0.70, or 18%, to \$4.53 per square foot for the year ended December 31, 2023, from \$3.83 per square foot for the year ended December 31, 2022. The increase in average selling price reflected the impact of price increases enacted in 2023 and a change in the mix of products sold, as we strive to maximize capacity in our aerogel manufacturing facility. This increase in average selling price had the effect of increasing product revenue by approximately \$19.9 million for the year ended December 31, 2023.

In volume terms, product shipments decreased by 4.2 million square feet, or 13%, to 28.4 million square feet of aerogel products for the year ended December 31, 2023, as compared to 32.6 million square feet in the year ended December 31, 2022. The decrease in product volume had the effect of decreasing product revenue by approximately \$16.1 million for the year ended December 31, 2023.

Thermal barrier revenue was \$110.1 million for the year ended December 31, 2023, as compared to \$55.6 million for the year ended December 31, 2022. Thermal barrier revenue for the year ended December 31, 2023 included \$97.5 million to a major U.S. automotive OEM and \$5.5 million to a major Asian automotive OEM. Thermal barrier revenue for the year ended December 31, 2022 included \$45.8 million to a major U.S. automotive OEM and \$5.1 million to a major Asian automotive OEM.

Energy industrial revenue as a percentage of total revenue was 54% and 69% of total revenue in 2023 and in 2022, respectively. Thermal barrier revenue was 46% and 31% of total revenue in 2023 and in 2022, respectively.

Cost of Revenue

| | Year Ended December 31, | | | | Change | |
|-----------------------|-------------------------|----------------------|-------------------|----------------------|-----------------|------------|
| | 2023 | | 2022 | | | |
| | Amount | % of Related Revenue | Amount | % of Related Revenue | Amount | Percentage |
| (\$ in thousands) | | | | | | |
| Cost of revenue: | | | | | | |
| Energy industrial | \$ 94,477 | 73% | \$ 105,963 | 85% | \$ (11,486) | (11)% |
| Thermal barrier | 87,320 | 79% | 69,425 | 125% | 17,895 | 26% |
| Total cost of revenue | <u>\$ 181,797</u> | <u>76%</u> | <u>\$ 175,388</u> | <u>97%</u> | <u>\$ 6,409</u> | <u>4%</u> |

Total cost of revenue increased \$6.4 million, or 4%, to \$181.8 million in 2023 from \$175.4 million in 2022. The increase in total cost of revenue was the result of an increase in thermal barrier, offset, in part, by a decrease in energy industrial cost of revenue.

Energy industrial cost of revenue decreased \$11.5 million, or 11%, to \$94.5 million from \$106.0 million in the comparable period in 2022. The \$11.5 million decrease was the result of a \$11.4 million decrease in material costs and a \$0.1 million decrease in manufacturing and other operating costs from the comparable period in 2022. The decrease in material costs was the result of the lower revenue volume from the comparable period in 2022, and lower raw material costs in 2023 compared to 2022.

Thermal barrier cost of revenue increased \$17.9 million to \$87.3 million as compared to \$69.4 million in the comparable period in 2022. The \$17.9 million increase was the result of a \$5.8 million increase in material costs and a \$12.1 million increase in manufacturing costs. The increase in material costs was the result of the increase in revenue volume from the comparable period in 2022, offset by lower raw material prices in 2023 compared to 2022. The increase in manufacturing costs was driven by increases in depreciation and facility costs of \$7.1 million and utilities expenses of \$3.3 million and other manufacturing and operating costs of \$1.7 million.

Gross Profit

| | Year Ended December 31, | | | | Change | |
|--------------------|-------------------------|-----------------------|-----------------|-----------------------|------------------|------------|
| | 2023 | | 2022 | | | |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | Amount | Percentage |
| (\$ in thousands) | | | | | | |
| Gross profit: | | | | | | |
| Energy industrial | \$ 34,162 | 27% | \$ 18,844 | 15% | \$ 15,318 | 81% |
| Thermal barrier | 22,759 | 21% | (13,868) | (25)% | 36,627 | 264% |
| Total gross profit | <u>\$ 56,921</u> | 24% | <u>\$ 4,976</u> | 3% | <u>\$ 51,945</u> | 1,044% |

Gross profit increased \$51.9 million, or 1,044%, to \$56.9 million in 2023 from \$5.0 million in 2022. The increase in gross profit was the result of the \$58.3 million increase in total revenue, partially offset by the \$6.4 million increase in total cost of revenue. The increase in total cost of revenue was principally driven by the increase in overhead costs and additional resources to support our expected higher run-rate revenue in future periods for both our energy industrial and thermal barrier products.

Research and Development Expenses

| | Year Ended December 31, | | | | Change | |
|-----------------------------------|-------------------------|-----------------------|-----------|-----------------------|----------|------------|
| | 2023 | | 2022 | | | |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | Amount | Percentage |
| (\$ in thousands) | | | | | | |
| Research and development expenses | \$ 16,356 | 7% | \$ 16,930 | 9% | \$ (574) | (3)% |

Research and development expenses decreased by \$0.5 million, or 3%, to \$16.4 million in 2023 from \$16.9 million in 2022. The \$0.5 million decrease was the result of decreases in professional fees of \$1.5 million, operating material and supplies costs of \$0.7 million, compensation and related costs of \$0.6 million, partially offset by an increase in depreciation and facility related expenses of \$2.1 million and other research and development expenses of \$0.2 million.

Research and development expenses as a percentage of total revenue decreased to 7% during the year ended December 31, 2023 from 9% in the comparable period in 2022, primarily due to the decrease in professional fees.

Sales and Marketing Expenses

| | Year Ended December 31, | | | | Change | |
|------------------------------|-------------------------|-----------------------|-----------|-----------------------|----------|------------|
| | 2023 | | 2022 | | | |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | Amount | Percentage |
| (\$ in thousands) | | | | | | |
| Sales and marketing expenses | \$ 33,008 | 14% | \$ 28,792 | 16% | \$ 4,216 | 15% |

Sales and marketing expenses increased by \$4.2 million, or 15%, to \$33.0 million in 2023 from \$28.8 million in 2022. The increase was the result of increases in depreciation and facility related expenses of \$2.9 million and compensation and related costs of \$2.1 million, partially offset by a decrease in operating material and supplies costs of \$0.8 million.

Sales and marketing expenses as a percentage of total revenue decreased to 14% in 2023 from 16% in 2022 primarily due to the 32% increase in revenue from the comparable period in 2022.

General and Administrative Expenses

| | Year Ended December 31, | | | | Change | |
|-------------------------------------|-------------------------|-----------------------|-----------|-----------------------|-----------|------------|
| | 2023 | | 2022 | | Amount | Percentage |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | | |
| | (\$ in thousands) | | | | | |
| General and administrative expenses | \$ 56,760 | 24% | \$ 38,499 | 21% | \$ 18,261 | 47% |

General and administrative expenses increased by \$18.3 million, or 47%, to \$56.8 million in 2023 from \$38.5 million in 2022. The \$18.3 million increase was the result of increases in compensation and related costs of \$15.3 million and professional fees of \$3.6 million, offset by a decrease in other costs of \$0.6 million.

General and administrative expenses as a percentage of total revenue increased to 24% in 2023 from 21% in 2022 primarily due to increased expenditures associated with the growth in our human resource, finance, information technology and general management organizations in preparation for the anticipated growth in our business.

Other Income (Expense), net

| | Year Ended December 31, | | | | Change | |
|--|-------------------------|-----------------------|-------------------|-----------------------|-----------------|------------|
| | 2023 | | 2022 | | Amount | Percentage |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | | |
| | (\$ in thousands) | | | | | |
| Other income (expense): | | | | | | |
| Interest expense, related party | \$ (5,328) | (2)% | \$ (5,110) | (3)% | \$ (218) | 4% |
| Interest income, net | 6,534 | 3% | 1,617 | 1% | 4,917 | NM |
| Income from Employee Retention Credits | 2,186 | 1% | — | 0% | 2,186 | NM |
| Total other income (expense), net | <u>\$ 3,392</u> | 1% | <u>\$ (3,493)</u> | (2)% | <u>\$ 6,885</u> | NM |

Other income (expense), net increased by \$6.9 million to \$3.4 million in 2023 from \$(3.5) million in 2022. The \$6.9 million increase was the result of \$4.9 million of interest income, \$2.2 million of Employee Retention Credits and a \$(0.2) million net impact of capitalized interest relating to our Convertible Note in the comparable period in 2022.

Year ended December 31, 2022 compared to year ended December 31, 2021

The following tables set forth our results of operations for the periods presented:

| | Year Ended December 31, | | | | Year Ended December 31, | |
|--|-------------------------|-------------|-------------|----------|-------------------------------|-------|
| | 2022 | 2021 | \$ Change | % Change | 2022 | 2021 |
| | (\$ in thousands) | | | | (Percentage of total revenue) | |
| Revenue | \$ 180,364 | \$ 121,622 | \$ 58,742 | 48% | 100% | 100% |
| Cost of revenue | 175,388 | 111,685 | 63,703 | 57% | 97% | 92% |
| Gross profit | 4,976 | 9,937 | (4,961) | (50)% | 3% | 8% |
| Operating expenses | | | | | | |
| Research and development | 16,930 | 11,441 | 5,489 | 48% | 9% | 9% |
| Sales and marketing | 28,792 | 16,581 | 12,211 | 74% | 16% | 14% |
| General and administrative | 38,499 | 22,514 | 15,985 | 71% | 21% | 19% |
| Total operating expenses | 84,221 | 50,536 | 33,685 | 67% | 47% | 42% |
| Loss from operations | (79,245) | (40,599) | (38,646) | 95% | (44)% | (33)% |
| Other income (expense) | | | | | | |
| Interest expense, convertible note - related party | (5,110) | — | (5,110) | 100% | (3)% | 0% |
| Interest income (expense), net | 1,617 | (229) | 1,846 | (806)% | 1% | 0% |
| Gain on extinguishment of debt | — | 3,734 | (3,734) | 100% | —% | 3% |
| Total other income (expense) | (3,493) | 3,505 | (6,998) | (200)% | (2)% | 3% |
| Net loss | \$ (82,738) | \$ (37,094) | \$ (45,644) | (123)% | (46)% | (30)% |

Revenue

| | Year Ended December 31, | | | | Change | |
|-------------------|-------------------------|-----------------------|------------|-----------------------|-----------|------------|
| | 2022 | | 2021 | | | |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | Amount | Percentage |
| | (\$ in thousands) | | | | | |
| Revenue: | | | | | | |
| Energy industrial | \$ 124,807 | 69% | \$ 114,958 | 95% | \$ 9,849 | 9% |
| Thermal barrier | 55,557 | 31% | 6,664 | 5% | 48,893 | NM |
| Total revenue | \$ 180,364 | 100% | \$ 121,622 | 100% | \$ 58,742 | 48% |

The following chart sets forth product shipments in square feet associated with recognized revenue, including revenue recognized over time, for the periods presented:

| | Year Ended December 31, | | Change | |
|---|-------------------------|--------|----------|------------|
| | 2022 | 2021 | Amount | Percentage |
| Product shipments in square feet (in thousands) | 32,589 | 34,557 | (1,968) | (6)% |

Total revenue increased \$58.7 million, or 48%, to \$180.3 million in 2022 from \$121.6 million in 2021. The increase in total revenue was the result of increases in both energy industrial and thermal barrier revenue.

Energy industrial revenue increased by \$9.8 million, or 9%, to \$124.8 million in 2022 from \$115.0 million in 2021. This increase was driven by a more favorable mix of product shipments in the global petrochemical and refinery markets, particularly in Asia and North America, project-based demand in the subsea market, offset, in part, by a decrease in maintenance-based demand in the global petrochemical and refinery markets in Europe.

Energy industrial revenue for the years ended December 31, 2022 and 2021, included \$39.3 million and \$34.1 million in sales to Distribution International, Inc., respectively. The average selling price per square foot of our products increased by \$0.50, or 15%, to \$3.83 per square foot for the year ended December 31, 2022, from \$3.33 per square foot for the year ended December 31, 2021. This increase in average selling price principally reflected the impact of a change in the mix of products sold. This increase in average selling price had the effect of increasing product revenue by approximately \$16.3 million for the year ended December 31, 2022.

In volume terms, product shipments decreased by 2.0 million square feet, or 6%, to 32.6 million square feet of aerogel products for the year ended December 31, 2022, as compared to 34.6 million square feet in the year ended December 31, 2021. The decrease in product volume had the effect of decreasing product revenue by approximately \$6.6 million for the year ended December 31, 2022.

Thermal barrier revenue was \$55.6 million for the year ended December 31, 2022, as compared to \$6.7 million for the year ended December 31, 2021. Thermal barrier revenue for the year ended December 31, 2022 included \$45.8 million to a major U.S. automotive OEM and \$5.1 million to a major Asian automotive OEM.

Energy industrial revenue as a percentage of total revenue was 69% and 95% of total revenue in 2022 and in 2021, respectively. Thermal barrier revenue was 31% and 5% of total revenue in 2022 and in 2021, respectively.

Cost of Revenue

| | Year Ended December 31, | | | | Change | |
|-----------------------|-------------------------|-------------------------------|------------|-------------------------------|-----------|------------|
| | 2022 | | 2021 | | Amount | Percentage |
| | Amount | Percentage of Related Revenue | Amount | Percentage of Related Revenue | | |
| | | | | | | |
| Cost of revenue: | | | | | | |
| Energy industrial | \$ 105,963 | 85% | \$ 100,472 | 87% | \$ 5,491 | 5% |
| Thermal barrier | 69,425 | 125% | 11,213 | NM | 58,212 | NM |
| Total cost of revenue | \$ 175,388 | 97% | \$ 111,685 | 92% | \$ 63,703 | 57% |

Total cost of revenue increased \$63.7 million, or 57%, to \$175.4 million in 2022 from \$111.7 million in 2021. The increase in total cost of revenue was the result of an increases in thermal barrier and energy industrial cost of revenue.

Energy industrial cost of revenue increased \$5.5 million, or 5%, to \$106.0 million from \$100.5 million in the comparable period in 2021. The \$5.5 million increase was the result of a \$16.4 million increase in material costs, offset by a \$10.9 million decrease in manufacturing and other operating costs from the comparable period in 2021.

Thermal barrier cost of revenue increased \$58.2 million to \$69.4 million as compared to \$11.2 million in the comparable period in 2021. The \$58.2 million increase was the result of a \$17.0 million increase in material costs and a \$41.2 million increase in manufacturing costs. The increase in material costs was the result of the increase in revenue volume from the comparable period in 2021. The increase in manufacturing was driven by increases in compensation and related costs of \$11.7 million and other manufacturing and operating costs of \$29.5 million.

Gross Profit

| | Year Ended December 31, | | | | Change | |
|--------------------|-------------------------|-----------------------|-----------------|-----------------------|-------------------|--------------|
| | 2022 | | 2021 | | Amount | Percentage |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | | |
| Gross profit: | | | | | | |
| Energy industrial | \$ 18,844 | 15% | \$ 14,486 | 13% | \$ 4,358 | 30% |
| Thermal barrier | (13,868) | (25)% | (4,549) | NM | (9,319) | NM |
| Total gross profit | <u>\$ 4,976</u> | <u>3%</u> | <u>\$ 9,937</u> | <u>8%</u> | <u>\$ (4,961)</u> | <u>(50)%</u> |

Gross profit decreased \$4.9 million, or 50%, to \$5.0 million in 2022 from \$9.9 million in 2021. The decrease in gross profit was the result of the \$63.7 million increase in total cost of revenue, partially offset by the \$58.7 million increase in total revenue. The increase in total cost of revenue was principally driven by the increase in overhead costs and additional resources to support our expected higher run-rate revenue in future periods for both our energy industrial and thermal barrier products.

Research and Development Expenses

| | Year Ended December 31, | | | | Change | |
|-----------------------------------|-------------------------|-----------------------|-----------|-----------------------|----------|------------|
| | 2022 | | 2021 | | Amount | Percentage |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | | |
| | (\$ in thousands) | | | | | |
| Research and development expenses | \$ 16,930 | 9% | \$ 11,441 | 9% | \$ 5,489 | 48% |

Research and development expenses increased by \$5.5 million, or 48%, to \$16.9 million in 2022 from \$11.4 million in 2021. The \$5.5 million increase was the result of increases in compensation and related costs of \$2.5 million, professional fees and materials costs of \$1.1 million, equipment and lease costs of \$0.9 million, depreciation expenses of \$0.7 million and other research and development expenses of \$0.3 million.

Research and development expenses as a percentage of total revenue was 9% during the years ended December 31, 2022 and 2021.

Sales and Marketing Expenses

| | Year Ended December 31, | | | | Change | |
|------------------------------|-------------------------|-----------------------|-----------|-----------------------|-----------|------------|
| | 2022 | | 2021 | | Amount | Percentage |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | | |
| | (\$ in thousands) | | | | | |
| Sales and marketing expenses | \$ 28,792 | 16% | \$ 16,581 | 14% | \$ 12,211 | 74% |

Sales and marketing expenses increased by \$12.2 million, or 74%, to \$28.8 million in 2022 from \$16.6 million in 2021. The increase was the result of increases in compensation and related costs of \$7.2 million, operating material and supplies costs of \$1.8 million, travel related costs of \$1.6 million, marketing costs of \$0.8 million and professional fees and other expenses of \$0.8 million.

Sales and marketing expenses as a percentage of total revenue increased to 16% in 2022 from 14% in 2021 primarily due to elevated levels of compensation associated with an increase in sales and marketing personnel.

General and Administrative Expenses

| | Year Ended December 31, | | | | Change | |
|-------------------------------------|-------------------------|-----------------------|-----------|-----------------------|-----------|------------|
| | 2022 | | 2021 | | Amount | Percentage |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | | |
| | (\$ in thousands) | | | | | |
| General and administrative expenses | \$ 38,499 | 21% | \$ 22,514 | 19% | \$ 15,985 | 71% |

General and administrative expenses increased by \$16.0 million, or 71%, to \$38.5 million in 2022 from \$22.5 million in 2021. The \$16.0 million increase was the result of increases in compensation and related costs of \$8.8 million, professional fees and other costs of \$3.3 million, leasing and facility costs of \$1.5 million, information technology related costs of \$1.3 million and legal related costs of \$1.1 million.

General and administrative expenses as a percentage of total revenue increased to 21% in 2022 from 19% in 2021 primarily due to increased expenditures associated with the growth in our human resource, finance, information technology and general management organizations in preparation for the anticipated growth in our business.

Interest Expense, net

| | Year Ended December 31, | | | | Change | |
|---------------------------------|-------------------------|-----------------------|----------|-----------------------|-------------|------------|
| | 2022 | | 2021 | | Amount | Percentage |
| | Amount | Percentage of Revenue | Amount | Percentage of Revenue | | |
| | (\$ in thousands) | | | | | |
| Interest expense: | | | | | | |
| Interest expense, related party | \$ (5,110) | (3)% | \$ — | 0% | \$ (5,110) | NM |
| Interest income (expense), net | 1,617 | 1% | (229) | (0)% | 1,846 | NM |
| Total interest expense, net | \$ (3,493) | (2)% | \$ (229) | (0)% | \$ (3,264) | NM |

Interest expense, net increased by \$3.3 million to \$3.5 million in 2022 from \$0.2 million in 2021. The \$3.3 million increase was the result of increase in interest expense, related party by \$5.1 million offset by increase in interest income, net of \$1.8 million. Increase in interest expense, related party of \$5.1 million was the result of interest relating to our Convertible Note. Interest income, net increased by \$1.8 million to \$1.6 million in 2022 from \$(0.2) million in 2021 due to higher cash balances throughout 2022, in addition to more favorable interest rates.

Liquidity and Capital Resources

Overview

We have experienced significant losses and invested substantial resources since our inception to develop, commercialize and protect our aerogel technology and to build a manufacturing infrastructure capable of supplying aerogel products at the volumes and costs required by our customers. These investments have included research and development and other operating expenses, capital expenditures, and investment in working capital balances.

Our long-term financial projections anticipate revenue growth, increasing levels of gross profit, and improved cash flows from operations. To meet expected growth in demand for our aerogel products in the EV market, we have been in the process of expanding our aerogel blanket capacity by constructing a second manufacturing plant in Bulloch County, Georgia. However, in order to manage the development of the second plant so that its increased capacity comes online in a manner that aligns with our current expectations of demand from our EV customers, we are extending the timeframe for construction and commissioning of the second plant until such time as its capacity is supported by increased demand. In the meantime, and until we ramp up construction, we expect to be able to substantially reduce our planned capital expenditures for 2024. At the same time, we believe that productivity improvements in our existing Rhode Island facility combined with the supplemental supply of our energy industrial products from one or more external manufacturing facilities in China will permit us to achieve a target revenue capacity of approximately \$650 million in 2024 and prior to the completion and start-up of the second plant. Nonetheless, there can be no assurance as to when we will ramp up construction on the second plant. There can also be no assurance that our contract manufacturing strategy of meeting the demand of our energy industrial customers with supply from one or more external manufacturing facilities in China will provide us with adequate manufacturing capacity or supply for that expected demand. Furthermore, when we ramp up construction on the second plant, further cost inflation and/or supply chain disruptions, as well as potential changes in the scope of the facilities, could lead to increases to our prior estimated costs for completion of the second plant.

We are also increasing our investment in the research and development of next-generation aerogel products and technologies. During 2024, we will continue to develop aerogel products and technologies for the EV market. We believe the commercial potential for our technology in the EV market is significant. To meet the anticipated revenue growth and take advantage of this market opportunity, we are adding personnel, incurring additional operating expenses, and planning to construct a carbon aerogel battery materials facility, among other items.

During the year ended December 31, 2022, we sold 5,241,400 shares of our common stock through the 2022 ATM offering program and received net proceeds of \$72.7 million. On November 29, 2022, we completed an underwritten public offering of 29,052,631 shares of our common stock at a public offering price of \$9.50 per share. We received net proceeds of \$267.5 million after deducting underwriting discounts and commissions of \$8.1 million and offering expenses of approximately \$0.5 million.

In February 2022, we sold and issued to an affiliate of Koch \$100.0 million in aggregate principal amount of our Convertible Senior PIK Toggle Notes. In addition, in March 2022, pursuant to a securities purchase agreement dated February 15, 2022, we sold to an affiliate of Koch 1,791,986 shares of our common stock, at a price of \$27.902 per share, for net proceeds of \$49.9 million after deducting fees and offering expenses of \$0.1 million.

On December 19, 2023, we entered into a securities purchase agreement with certain institutional investors named therein, pursuant to which we issued and sold, in a registered direct offering directly to the Investors an aggregate of 6,060,607 shares of our common stock at an offering price of \$12.38 per share. We received net proceeds of \$74.4 million, after deducting offering expenses of approximately \$0.6 million.

We believe that our December 31, 2023 cash and cash equivalents balance of \$139.7 million will be sufficient to support current operating requirements, current research and development activities and the initial capital expenditures required to support the evolving commercial opportunities in the EV market and other strategic business opportunities.

We may, from time to time, enter into leasing arrangements including sale and leaseback financing arrangements. In January 2024, we entered into a sale and leaseback arrangement, pursuant to which we sold certain equipment to the Leasing Company for a one-time cash payment of \$5.0 million and leased back such equipment from the Leasing Company. The associated monthly lease rents will be paid over the term of three years.

However, we plan to supplement our cash balance and available credit with equity financings, debt financings, equipment leasing, sale-leaseback transactions, customer prepayments or government grant and loan programs to provide the additional capital necessary to purchase the capital equipment, construct the new facilities and complete the aerogel capacity expansions required to support our evolving commercial opportunities and strategic business initiatives. We also intend to enter into a new revolving credit facility. Furthermore, we have certain assets that are currently owned, which we are evaluating for potential sale and lease back arrangements. This type of arrangement would provide us with one-time cash payments in the near term, in exchange for future lease payments. We believe that consummation of equity financings could potentially result in an ownership change under Section 382 of the Internal Revenue Code. Such an ownership change would lead to the use of our net operating loss carryforwards being restricted. Our inability to use a substantial portion of our net operating loss carryforwards would result in a higher effective tax rate and adversely affect our financial condition and results of operations.

Primary Sources of Liquidity

Our principal sources of liquidity are currently our cash and cash equivalents. Cash and cash equivalents consist primarily of cash, money market accounts, and sweep accounts on deposit with banks. As of December 31, 2023, we had \$139.7 million of cash and cash equivalents.

In February 2022, we sold and issued to an affiliate of Koch \$100.0 million in aggregate principal amount of our Convertible Senior PIK Toggle Notes. In addition, in March 2022, pursuant to a securities purchase agreement dated February 15, 2022, we sold to an affiliate of Koch 1,791,986 shares of our common stock, at a price of \$27.902 per share, for net proceeds of \$49.9 million after deducting fees and offering expenses of \$0.1 million.

On March 16, 2022, we entered into a sales agreement for an ATM offering program with Cowen and Company, LLC and Piper Sandler & Co., as our sales agents. During the year ended December 31, 2022, we sold 5,241,400 shares of our common stock through the 2022 ATM offering program and received net proceeds of \$72.7 million. The 2022 ATM offering program was terminated on June 20, 2023.

On November 28, 2022, our wholly owned subsidiary, Aspen Aerogels Georgia, LLC, entered into a \$100.0 million loan agreement with GM for which the proceeds to be used for the construction and operation of our planned aerogel manufacturing facility in Bulloch County, Georgia. The agreement allows for borrowings beginning in on the date that is twelve (12) months prior to the date agreed upon by Borrower and GM for the start of production at the Plant and ending on March 31, 2024 (or any later date approved in writing by GM at its sole discretion).

On November 29, 2022, we completed an underwritten public offering of 29,052,631 shares of our common stock at a public offering price of \$9.50 per share. We received net proceeds of \$267.5 million after deducting underwriting discounts and commissions of \$8.1 million and offering expenses of approximately \$0.5 million.

On December 19, 2023, we entered into a securities purchase agreement with certain institutional investors named therein, pursuant to which we issued and sold, in a registered direct offering directly to the Investors an aggregate of 6,060,607 shares of our common stock at an offering price of \$12.38 per share. We received net proceeds of \$74.4 million, after deducting offering expenses of approximately \$0.6 million.

See “Risk Factors - Risks Related to Our Business and Strategy - We will require significant additional capital to pursue our growth strategy, but we may not be able to obtain additional financing on acceptable terms or at all” in this Annual Report on Form 10-K for the year ended December 31, 2022.

Analysis of Cash Flow

The following table summarizes our cash flows for the periods indicated:

| | Year Ended December 31, | | |
|--|-------------------------|-------------|-------------|
| | 2023 | 2022 | 2021 |
| | (\$ in thousands) | | |
| Net cash provided by (used in): | | | |
| Operating activities | \$ (42,612) | \$ (94,399) | \$ (18,628) |
| Investing activities | (175,455) | (177,974) | (13,778) |
| Financing activities | 75,477 | 478,370 | 92,474 |
| Net increase (decrease) in cash | (142,590) | 205,997 | 60,068 |
| Cash and cash equivalents, beginning of period | 282,561 | 76,564 | 16,496 |
| Cash and cash equivalents, end of period | \$ 139,971 | \$ 282,561 | \$ 76,564 |

Operating Activities

During 2023, we used \$42.6 million in net cash in operating activities, as compared to the use of \$94.4 million in net cash during 2022, a decrease in the use of cash of \$51.8 million. This decrease in the use of cash was the result of the decrease in net loss adjusted for non-cash items of \$44.8 million, and a decrease in cash used by changes in working capital of \$7.0 million.

During 2022, we used \$94.4 million in net cash in operating activities, as compared to the use of \$18.6 million in net cash during 2021, an increase in the use of cash of \$75.8 million. This increase in the use of cash was the result of the increase in net loss adjusted for non-cash items of \$31.6 million, and a decrease in cash provided by changes in working capital of \$44.2 million.

Investing Activities

Net cash used in investing activities is for capital expenditures for machinery and equipment principally to improve the throughput, efficiency and capacity of our East Providence facility, our automated fabrication facility in Mexico and engineering designs for the planned aerogel manufacturing facility in Bulloch County, Georgia. Net cash used in investing activities for 2023 and 2022 totaled \$175.5 million and \$178.0 million, respectively.

Financing Activities

Net cash provided by financing activities in 2023 totaled \$75.5 million and consisted of net proceeds from the registered direct offering of common stock of \$74.2 million and \$1.7 million in proceeds from employee stock option exercises, offset, in part, by \$0.4 million in cash used for payments made for employee tax withholdings associated with the vesting of restricted stock units.

Net cash provided by financing activities in 2022 totaled \$478.4 million and consisted of \$267.5 million of net proceeds from our underwritten public offering, \$99.8 million in net proceeds from the issuance of convertible debt, \$72.7 million of net proceeds from our 2022 ATM offering program, net proceeds from the private placement of common stock of \$49.9 million, and proceeds from employee stock option exercises of \$0.6 million, offset, in part, by \$9.7 million for payments of a prepayment liability and \$2.4 million for payments for employee tax withholdings associated with the vesting of restricted stock units.

Capital Spending and Future Capital Requirements

We have made capital expenditures primarily to develop and expand our manufacturing capacity. Our capital expenditures totaled \$175.5 million in 2023, \$178.0 million in 2022 and \$13.8 million in 2021. As of December 31, 2023, we had capital commitments of approximately \$202.6 million, which included commitments for which we have entered into contracts as well as commitments authorized by our Board of Directors. These commitments relate to the enhancement of our existing production lines in our East Providence facility and our fabrication operation in Mexico, and the planned aerogel manufacturing facility in Bulloch County, Georgia and consist primarily of costs for equipment and construction.

As indicated in the overview of the liquidity and capital resources section, in order to manage the development of the second plant so that its increased capacity comes online in a manner that aligns with our current expectations as to demand from our EV customers, we are extending the timeframe for construction and commissioning of the second plant until such time as its capacity is supported by increased demand. In the meantime, and until we ramp up construction, we expect to be able to substantially reduce our planned capital expenditures for 2024.

We intend to fund capital expenditures related to the expansion of capacity of our existing manufacturing facility with our existing cash balance and anticipated cash flows from operations. We plan to fund the capital expenditures required to build a carbon aerogel battery materials facility, and to construct a new aerogel blanket manufacturing facility with additional equity financings, debt financings, equipment leasing, sale-leaseback transactions, customer prepayments, government grant and loan programs or credit facilities.

Contractual Obligations and Commitments

Operating Leases

We lease office space for our corporate offices in Northborough, Massachusetts, which expires in 2031. We also lease additional facilities in East Providence, Rhode Island; Marlborough, Massachusetts; Monterrey, Mexico; and Pawtucket, Rhode Island for research, administrative, fabrication, and warehousing purposes under leases expiring between January 31, 2024 and April 30, 2034. See “Item 2 — Properties.” We also lease vehicles and equipment under non-cancelable operating leases that expire at various dates.

Thermal Barrier Contract

We are party to production contracts with GM, to supply fabricated, multi-part thermal barriers, or Barriers, for use in the battery system of its next-generation EVs, or Contracts. Pursuant to the Contracts, we are obligated to supply Barriers at fixed annual prices and at volumes to be specified by the OEM up to a daily maximum quantity through the respective terms of the agreements, which expire at various times from 2026 through 2034. While the OEM has agreed to purchase its requirement for Barriers for locations to be designated from time to time by the OEM, it has no obligation to purchase any minimum quantity of Barriers under the Contracts. In addition, the OEM may terminate the Contracts any time and for any or no reason. All other terms of the Contracts are generally consistent with the OEM’s standard purchase terms, including quality and warranty provisions customary in the automotive industry.

Revolving Credit Facility

On March 12, 2021, we entered into an Amended and Restated Loan and Security Agreement, or the SVB Loan Agreement, with Silicon Valley Bank, or SVB.

On November 28, 2022, we terminated the SVB Loan Agreement with Silicon Valley Bank. As of the date of termination, we had no amounts due or owed to SVB under the SVB Loan Agreement for any principal, interest, or other amounts, other than approximately \$1.2 million in letters of credit that were issued under the SVB Loan Agreement and were cash collateralized in connection with the termination of the SVB Loan Agreement.

Convertible Note - Related Party

On February 18, 2022, we sold and issued to an affiliate of Koch \$100.0 million in aggregate principal amount of Notes. The Notes bear interest at the rate of SOFR plus 5.50% per annum if interest is paid in cash, or, if interest is paid in kind (through an increase in the principal amount of the outstanding Notes or through the issuance of additional Notes), at SOFR plus 6.50% per annum. Under the terms of the investment, SOFR has a floor of 1% and a cap of 3%. We can elect to make any interest payment through Cash Interest, PIK Interest or any combination thereof. Interest on the Notes is payable semi-annually in arrears on June 30 and December 30, commencing on June 30, 2022. It is expected that the Notes will mature on February 18, 2027, subject to earlier conversion, redemption or repurchase.

The Notes are convertible at the option of the holder at any time until the business day prior to the maturity date, including in connection with a redemption by us. On November 28, 2022, in connection with the Loan Agreement, we entered into an amendment to the Notes, or the Convertible Note Amendment, to reduce the initial Conversion Price (as defined in the Notes) by \$5.00 per share from \$34.936625 per share to \$29.936625 per share, by increasing the initial Conversion Rate (as defined in the Notes) from 28.623257 shares per \$1,000 of Capitalized Principal Amount (as defined in the Notes) to 33.400100 shares per \$1,000 of Capitalized Principal Amount under the Notes, subject to customary anti-dilution and other adjustments (as described in the Indenture, which governs the Notes). If the closing price per share of our common stock on the New York Stock Exchange is at least 130% of the Conversion Price for 20 consecutive trading days, we may elect to convert the principal and accrued interest owing under the Notes, plus a make-whole amount equal to the sum of the present values of the remaining interest payments that would have otherwise been payable from the date of such conversion, redemption or repurchase, as applicable, through maturity, or the Make-Whole Amount, into our common stock at the Conversion Price.

The Notes are redeemable by us at any time and from time to time in the event that the volume weighted average price of our common stock for the 10 trading days immediately preceding the date on which we provide the redemption notice has been at least 130% of the Conversion Price then in effect, at a redemption price of 100% of the principal amount of such Notes, plus accrued and unpaid interest to, but excluding the redemption date, plus the Make-Whole Amount.

Purchase Commitments

As of December 31, 2023, we had purchase commitments of approximately \$267.3 million, which included capital commitments of \$202.6 million. Purchase commitments related to capital expenditures are anticipated to be spent over the next three years, while our remaining purchase commitments are anticipated to be spent throughout 2024.

Purchase obligations relate primarily to open purchase orders for capital expenditures, inventories, and goods and services. Purchase obligations are entered into with various vendors in the normal course of business and are consistent with our expected requirements.

Recently Issued Accounting Standards

From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board, or FASB, or other standard setting bodies. Recently issued standards typically do not require adoption until a future effective date. Prior to their effective date, the Company evaluates the pronouncements to determine the potential effects of adoption to its consolidated financial statements.

Standards Implemented Since December 31, 2023

The Company has not implemented any accounting standards that had a material impact on its consolidated financial statements during the year ended December 31, 2023.

Standards to be Implemented

In November 2023, the Financial Accounting Standards Board (FASB) issued Accounting Standard Update (ASU) 2023-07 Segment Reporting (Topic 280) Improvements to Reportable Segment Disclosures to enhance disclosures about significant segment expenses. This ASU is effective for our fiscal year 2024 and interim periods in fiscal year 2025. Early adoption is permitted. We are currently evaluating segment expense disclosures related to its annual report for fiscal year 2024.

In December 2023, the FASB issued ASU 2023-09 Income Taxes (Topic 740) Improvements to Income Tax Disclosures that requires disclosure of disaggregated income taxes paid, prescribes standard categories for the components of the effective tax rate reconciliation, and modifies other income tax-related disclosures. This ASU is effective for our fiscal year 2025. Early adoption is permitted. We are currently evaluating income tax disclosures related to our annual report for fiscal year 2025. Although there are several other new accounting pronouncements issued by the FASB, we do not believe any of these accounting pronouncements had or will have a material impact on our Consolidated Financial Statements.

We believe that the impact of recently issued accounting standards that are not yet effective will not have a material impact on our consolidated financial statements.

Critical Accounting Policies and Estimates

Our financial statements are prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of our financial statements and related disclosures requires us to make estimates, assumptions and judgments that affect the reported amount of assets, liabilities, revenue, costs and expenses and related disclosures. We believe that the estimates, assumptions and judgments involved in these accounting policies have the greatest potential impact on our financial statements; and therefore, we consider these to be our critical accounting policies. Accordingly, we evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates under different assumptions and conditions. See note 2 to our consolidated financial statements included elsewhere in this Annual Report on Form 10-K for information about these critical accounting policies, as well as a description of our other significant accounting policies.

Revenue Recognition

We recognize revenue from the sale of our energy industrial aerogel products and thermal barriers. Revenue is recognized upon the satisfaction of contractual performance obligations. Products are typically delivered without significant post-sale obligations to customers other than standard warranty obligations for product defects. We provide warranties for our products and record the estimated cost within cost of sales in the period that the revenue is recorded. Our standard warranty period extends one to two years from the date of shipment, depending on the type of product purchased. Our warranties provide that our products will be free from defects in material and workmanship, and will, under normal use, conform to the specifications for the product.

We recorded warranty expense of \$0.5 million during the year ended December 31, 2023. We recorded warranty expense of \$0.2 million during the year ended December 31, 2022. We recorded warranty expense of less than \$0.1 million during the year ended December 31, 2021. As of December 31, 2023, we had satisfied all outstanding warranty claims.

Stock-based Compensation

We maintain an equity incentive plan pursuant to which our Board of Directors may grant qualified and nonqualified stock options, restricted stock, restricted stock units and other stock-based awards to board members, officers, key employees and others who provide or have provided service to us.

We measure the costs associated with stock-based awards based on their estimated fair value at date of grant. We recognize the cost of stock-based awards as service, performance or market conditions are met. Future expense amounts for any particular quarterly or annual period could be affected by changes in our assumptions or changes in market conditions.

Stock Options

We use the Black-Scholes option-pricing model to estimate the fair value of stock option awards. The determination of the estimated fair value of stock option awards is based on a number of complex and subjective assumptions. These assumptions include the determination of the estimated fair value of the underlying security, the expected volatility of the underlying security, a risk-free interest rate, the expected term of the option, and the forfeiture rate for the award class. The following assumptions were used to estimate the fair value of the option awards:

| | Year Ended December 31, | | |
|-------------------------------|-------------------------|---------|---------|
| | 2023 | 2022 | 2021 |
| Weighted-average assumptions: | | | |
| Expected term (in years) | 6.12 | 5.97 | 5.96 |
| Expected volatility | 70.04 % | 61.85 % | 59.80 % |
| Risk free rate | 4.08 % | 2.13 % | 0.86 % |
| Expected dividend yield | — % | — % | — % |

- The expected term represents the period that our stock-based awards are expected to be outstanding and is determined using the simplified method described in ASC Topic 718, *Compensation — Stock Compensation*, for all grants. We believe this is a better representation of the estimated life than our actual limited historical exercise behavior.
- For the years ended December 31, 2023, 2022 and 2021, we used our historical volatility as a basis to estimate expected volatility in the valuation of stock options.
- The risk-free interest rate is based on U.S. Treasury zero-coupon issues with a remaining term equal to the expected life assumed at the date of grant.
- We use an expected dividend yield of zero, since we do not intend to pay cash dividends on our common stock in the foreseeable future, nor have we paid dividends on our common stock in the past.

For stock options that contain a market condition, we use a Monte-Carlo Simulation model to estimate the grant date fair value of awards expected to vest. We based the simulation model on the Black Scholes option-pricing model and a number of other complex assumptions including (i) whether the vesting condition would be satisfied within the time-vesting periods, and (ii) the date the common stock price target would be achieved per the terms of the agreement.

For the restricted stock awards issued to our Chief Executive Officer during the year ended December 31, 2021 with vesting subject to achievement of

certain volume weighted average common stock price targets over a three-to-five year period, we used a Monte-Carlo simulation model to estimate the grant date fair value with respect to 461,616 shares of restricted common stock. The award had an aggregate grant date fair value of \$6.5 million.

On June 2, 2022, we issued 53,590 shares of restricted common stock, pursuant to a performance-based restricted stock agreement, to each of certain employees, with vesting in tranches, subject to achievement of certain time and performance vesting conditions, as defined, over a three-to-five year period. We used a Monte-Carlo simulation model to estimate the grant date fair value of the awards. The equity awards had a total aggregate fair value of \$4.0 million at the time of grant.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and rates. Our market risk exposure results primarily from fluctuations in interest rates as well as from inflation. In the normal course of business, we are exposed to market risks, including changes in interest rates which affect our line of credit under our revolving credit facility as well as cash flows. We may also face additional exchange rate risk in the future as we expand our business internationally.

Interest Rate Risk

We are exposed to changes in interest rates in the normal course of our business. At December 31, 2023, we had unrestricted cash and cash equivalents of \$139.7 million. These amounts were held for working capital and capital expansion purposes and were invested primarily in deposit accounts, money market accounts, and high-quality debt securities issued by the U.S. government via cash sweep accounts at major financial institutions in North America. Due to the short-term nature of these investments, we believe that our exposure to changes in the fair value of our cash as a result of changes in interest rates is not material.

As of December 31, 2023, we had \$0.2 million of restricted cash to support our outstanding letters of credit. We terminated our revolving credit facility agreement on November 28, 2022.

Inflation Risk

Although we expect that our operating results will be influenced by general economic conditions, we do not believe that inflation has had a material effect on our results of operations during the periods presented in this report. However, our business may be affected by inflation in the future.

Foreign Currency Exchange Risk

We are subject to inherent risks attributed to operating in a global economy. Virtually all of our revenue, receivables, purchases and debts are denominated in U.S. dollars.

Item 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
Aspen Aerogels, Inc.:

Opinions on the Consolidated Financial Statements and Internal Control Over Financial Reporting

We have audited the accompanying consolidated balance sheets of Aspen Aerogels, Inc. and subsidiaries (the Company) as of December 31, 2023 and 2022, the related consolidated statements of operations, stockholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2023, and the related notes and financial statement schedule II (collectively, the consolidated financial statements). We also have audited the Company's internal control over financial reporting as of December 31, 2023, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2023 and 2022, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2023, in conformity with U.S. generally accepted accounting principles. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2023 based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

Basis for Opinions

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

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over

financial reporting includes those policies and procedures that (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.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the consolidated financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of a critical audit matter does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Net realizable value of certain inventories

As discussed in Note 2 to the consolidated financial statements, inventories are stated at the lower of cost and net realizable value. As of December 31, 2023, the Company held inventories of \$39.2 million. The excess, obsolete or damaged goods provision recorded for inventories is equal to the difference between the cost of inventory and the estimated net realizable value, which is based upon assumptions about future demand, selling prices, and market conditions.

We identified the evaluation of the estimated net realizable value of certain inventories as a critical audit matter. A high degree of auditor judgment was required to evaluate the Company's assumption of future demand through future consumption, including whether past consumption is indicative of future consumption and the related effect on the net realizable value of certain inventories.

The following are the primary procedures we performed to address this critical audit matter. We evaluated the design and tested the operating effectiveness of certain internal controls related to the Company's inventory process. This included a control related to the Company's process to estimate future consumption. We assessed the Company's assumption related to future consumption and its correlation to past consumption by inquiring of relevant Company personnel regarding the impact of relevant changes to the overall business environment, including key customers and product lines. We compared the actual quantities of inventory on hand to actual consumption during the current year and subsequent to year-end to evaluate whether the historic and subsequent period consumption supported the Company's assumption related to future consumption. We recalculated the Company's estimate of the inventory provision based on the actual quantities of inventory on hand compared to the estimate of future consumption.

/s/ KPMG LLP

We have served as the Company's auditor since 2002.
Boston, Massachusetts
March 7, 2024

ASPEN AEROGELS, INC.
Consolidated Balance Sheets

| | December 31, | |
|--|--|------------|
| | 2023 | 2022 |
| | (In thousands, except share and per share data) | |
| Assets | | |
| Current assets: | | |
| Cash and cash equivalents | \$ 139,723 | \$ 281,335 |
| Restricted cash | 248 | 1,226 |
| Accounts receivable, net of allowances of \$230 and \$255 | 69,995 | 57,350 |
| Inventories | 39,189 | 22,538 |
| Prepaid expenses and other current assets | 17,176 | 7,236 |
| Total current assets | 266,331 | 369,685 |
| Property, plant and equipment, net | 417,227 | 259,223 |
| Operating lease right-of-use assets | 17,212 | 11,990 |
| Other long-term assets | 2,278 | 2,518 |
| Total assets | \$ 703,048 | \$ 643,416 |
| Liabilities and Stockholders' Equity | | |
| Current liabilities: | | |
| Accounts payable | \$ 51,094 | \$ 54,728 |
| Accrued expenses | 22,811 | 16,003 |
| Deferred revenue | 2,316 | 5,846 |
| Operating lease liabilities | 1,874 | 2,368 |
| Total current liabilities | 78,095 | 78,945 |
| Convertible note - related party | 114,992 | 103,580 |
| Operating lease liabilities long-term | 21,906 | 13,456 |
| Total liabilities | 214,993 | 195,981 |
| Commitments and contingencies (Note 12) | | |
| Stockholders' equity: | | |
| Preferred stock, \$0.00001 par value; 5,000,000 shares authorized, no shares issued or outstanding at December 31, 2023 and 2022 | — | — |
| Common stock, \$0.00001 par value; 250,000,000 shares authorized, 76,503,151 and 69,994,963 shares issued and outstanding at December 31, 2023 and December 31, 2022, respectively | — | — |
| Additional paid-in capital | 1,161,657 | 1,075,226 |
| Accumulated deficit | (673,602) | (627,791) |
| Total stockholders' equity | 488,055 | 447,435 |
| Total liabilities and stockholders' equity | \$ 703,048 | \$ 643,416 |

See accompanying notes to consolidated financial statements.

ASPEN AEROGELS, INC.
Consolidated Statements of Operations

| | Year Ended December 31, | | |
|--|---|-------------|-------------|
| | 2023 | 2022 | 2021 |
| | (In thousands, except share and per share data) | | |
| Revenue | \$ 238,718 | \$ 180,364 | \$ 121,622 |
| Cost of revenue | 181,797 | 175,388 | 111,685 |
| Gross profit | 56,921 | 4,976 | 9,937 |
| Operating expenses | | | |
| Research and development | 16,356 | 16,930 | 11,441 |
| Sales and marketing | 33,008 | 28,792 | 16,581 |
| General and administrative | 56,760 | 38,499 | 22,514 |
| Total operating expenses | 106,124 | 84,221 | 50,536 |
| Loss from operations | (49,203) | (79,245) | (40,599) |
| Other income (expense) | | | |
| Interest expense, convertible note - related party | (5,328) | (5,110) | — |
| Interest income (expense), net | 6,534 | 1,617 | (229) |
| Income from Employee Retention Credits | 2,186 | — | — |
| Gain on extinguishment of debt | — | — | 3,734 |
| Total other income (expense) | 3,392 | (3,493) | 3,505 |
| Net loss | \$ (45,811) | \$ (82,738) | \$ (37,094) |
| Net loss per share: | | | |
| Basic and diluted | \$ (0.66) | \$ (2.10) | \$ (1.22) |
| Weighted-average common shares outstanding: | | | |
| Basic and diluted | 69,439,034 | 39,363,114 | 30,433,154 |

See accompanying notes to consolidated financial statements.

ASPEN AEROGELS, INC.

Consolidated Statements of Stockholders' Equity
(In thousands, except share and per share data)

| | Preferred Stock | | Common Stock | | Additional Paid-in Capital | Accumulated Deficit | Total Stockholders' Equity |
|--|-----------------|-------|--------------|-------|----------------------------------|------------------------|----------------------------------|
| | Shares | Value | Shares | Value | | | |
| Balance at December 31, 2020 | — | \$ — | 27,821,685 | \$ — | \$ 575,811 | \$ (507,959) | \$ 67,852 |
| Net loss | — | — | — | — | — | (37,094) | (37,094) |
| Stock compensation expense | — | — | — | — | 5,176 | — | 5,176 |
| Issuance of restricted stock | — | — | 476,550 | — | — | — | — |
| Vesting of restricted stock units | — | — | 254,513 | — | (2,713) | — | (2,713) |
| Proceeds from employee stock option exercises | — | — | 351,387 | — | 2,301 | — | 2,301 |
| Proceeds from at-the-market offering, net of commissions and fees of \$601 and issuance costs of \$43 | — | — | 929,981 | — | 19,377 | — | 19,377 |
| Forfeiture of performance-based restricted stock | — | — | (78,125) | — | — | — | — |
| Proceeds from private placement of common stock, net of fees and issuance costs of \$1,491 | — | — | 3,462,124 | — | 73,509 | — | 73,509 |
| Balance at December 31, 2021 | — | \$ — | 33,218,115 | \$ — | \$ 673,461 | \$ (545,053) | \$ 128,408 |
| Net loss | — | — | — | — | — | (82,738) | (82,738) |
| Stock compensation expense | — | — | — | — | 9,385 | — | 9,385 |
| Issuance of restricted stock | — | — | 399,016 | — | — | — | — |
| Vesting of restricted stock units | — | — | 173,263 | — | (2,362) | — | (2,362) |
| Proceeds from employee stock option exercises | — | — | 118,552 | — | 553 | — | 553 |
| Proceeds from at-the-market offering, net of commissions and fees of \$2,269 and issuance costs of \$616 | — | — | 5,241,400 | — | 72,733 | — | 72,733 |
| Proceeds from private placement of common stock, net of fees and issuance costs of \$137 | — | — | 1,791,986 | — | 49,863 | — | 49,863 |
| Proceeds from underwritten public offering, net of underwriting discounts and commissions of \$8,052 and issuance costs of \$452 | — | — | 29,052,631 | — | 267,496 | — | 267,496 |
| Increase in debt discount due to modification of convertible note – related party | — | — | — | — | 4,097 | — | 4,097 |
| Balance at December 31, 2022 | — | \$ — | 69,994,963 | \$ — | \$ 1,075,226 | \$ (627,791) | \$ 447,435 |
| Net loss | — | — | — | — | — | (45,811) | (45,811) |
| Stock compensation expense | — | — | — | — | 10,954 | — | 10,954 |
| Issuance of restricted stock | — | — | 44,928 | — | — | — | — |
| Vesting of restricted stock units | — | — | 79,151 | — | (420) | — | (420) |
| Proceeds from employee stock option exercises | — | — | 323,502 | — | 1,659 | — | 1,659 |
| Proceeds from registered direct offering of common stock, net of fees and issuance costs of \$623 | — | — | 6,060,607 | — | 74,377 | — | 74,377 |
| Issuance costs from underwritten public offering | — | — | — | — | (139) | — | (139) |
| Balance at December 31, 2023 | — | \$ — | 76,503,151 | \$ — | \$ 1,161,657 | \$ (673,602) | \$ 488,055 |

See accompanying notes to consolidated financial statements.

ASPEN AEROGELS, INC.

Consolidated Statements of Cash Flows

| | Year Ended December 31, | | |
|---|-------------------------|--------------|--------------|
| | 2023 | 2022 | 2021 |
| | (In thousands) | | |
| Cash flows from operating activities: | | | |
| Net loss | \$ (45,811) | \$ (82,738) | \$ (37,094) |
| Adjustments to reconcile net loss to net cash used in operating activities: | | | |
| Depreciation | 15,318 | 9,222 | 9,440 |
| Gain on extinguishment of debt | — | — | (3,734) |
| Accretion of interest on convertible note - related party | 4,403 | 5,110 | — |
| Amortization of convertible note issuance costs | 37 | 32 | — |
| Amortization of debt discount due to modification of convertible note – related party | 888 | — | — |
| Amortization of debt issuance costs | — | — | 18 |
| Provision for bad debt | (93) | 115 | (85) |
| Stock compensation expense | 10,954 | 9,385 | 5,176 |
| Reduction in the carrying amount of operating lease right-of-use assets | 2,859 | 2,640 | 1,618 |
| Changes in operating assets and liabilities: | | | |
| Accounts receivable | (12,552) | (37,042) | (4,643) |
| Inventories | (16,651) | (10,551) | 1,112 |
| Prepaid expenses and other assets | (7,401) | (3,155) | (2,324) |
| Accounts payable | 4,583 | 5,318 | 7,379 |
| Accrued expenses | 6,808 | 5,184 | 6,983 |
| Deferred revenue | (3,530) | 4,525 | (543) |
| Operating lease liabilities | (2,424) | (2,444) | (1,497) |
| Other liabilities | — | — | (434) |
| Net cash used in operating activities | (42,612) | (94,399) | (18,628) |
| Cash flows from investing activities: | | | |
| Capital expenditures | (175,455) | (177,974) | (13,778) |
| Net cash used in investing activities | (175,455) | (177,974) | (13,778) |
| Cash flows from financing activities: | | | |
| Proceeds from underwritten public offering, net of underwriting discounts and commissions | — | 267,948 | — |
| Issuance costs from underwritten public offering | — | (452) | — |
| Proceeds from issuance of convertible note related party | — | 100,000 | — |
| Issuance costs from convertible note | — | (185) | — |
| Proceeds from employee stock option exercises | 1,659 | 553 | 2,301 |
| Payments made for employee restricted stock tax withholdings | (420) | (2,362) | (2,713) |
| Proceeds from at-the-market offering net of commissions and fees of \$2,269 and \$601 | — | 73,349 | 19,420 |
| Fees and issuance costs from at-the-market offering | — | (616) | (43) |
| Proceeds from registered direct offering of common stock | 75,000 | — | — |
| Fees and issuance costs from registered direct offering of common stock | (623) | — | — |
| Proceeds from private placement of common stock | — | 50,000 | 75,000 |
| Fees and issuance costs from private placement of common stock | (139) | (137) | (1,491) |
| Repayment of prepayment liability | — | (9,728) | — |
| Net cash provided by financing activities | 75,477 | 478,370 | 92,474 |
| Net (decrease) increase in cash, cash equivalents and restricted cash | (142,590) | 205,997 | 60,068 |
| Cash, cash equivalents and restricted cash at beginning of period | 282,561 | 76,564 | 16,496 |
| Cash, cash equivalents and restricted cash at end of period | \$ 139,971 | \$ 282,561 | \$ 76,564 |
| Supplemental disclosures of cash flow information: | | | |
| Interest paid | \$ 1 | \$ 153 | \$ 236 |
| Income taxes paid | \$ — | \$ — | \$ — |
| Supplemental disclosures of non-cash activities: | | | |
| Right-of-use assets obtained in exchange for new operating lease liabilities | \$ 10,380 | \$ 3,030 | \$ 12,092 |
| Capitalized Interest | \$ 6,084 | \$ 2,723 | \$ — |
| Increase in debt discount due to modification of convertible note – related party | \$ — | \$ 4,097 | \$ — |
| Changes in accrued capital expenditures | \$ (8,217) | \$ 31,970 | \$ 4,701 |

See accompanying notes to consolidated financial statements.

ASPEN AEROGELS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(1) Description of Business

Nature of Business

Aspen Aerogels, Inc. (the Company) is an aerogel technology company that designs, develops and manufactures innovative, high-performance aerogel insulation used primarily in the energy industrial and sustainable insulation materials markets. In addition, the Company has introduced a line of aerogel thermal barriers for use in battery packs in the electric vehicle ("EV") market. The Company is also developing applications for its aerogel technology in the battery materials and a number of other high-potential markets.

The Company maintains its corporate offices in Northborough, Massachusetts. The Company has three wholly owned subsidiaries: Aspen Aerogels Rhode Island, LLC, Aspen Aerogels Germany, GmbH and Aspen Aerogels Georgia, LLC.

Liquidity

During the year ended December 31, 2023, the Company incurred a net loss of \$45.8 million and used \$42.6 million of cash in operations and \$175.5 million of cash for capital expenditures. On February 15, 2022, the Company entered into a note purchase agreement with an affiliate of Koch Disruptive Technologies, LLC (Koch), relating to the issuance and sale of \$100.0 million of the Company's convertible debt. On November 29, 2022, the Company completed an underwritten public offering of 29,052,631 shares of our common stock at a public offering price of \$9.50 per share. The Company received net proceeds of \$267.5 million after deducting underwriting discounts and commissions of \$8.1 million and offering expenses of approximately \$0.5 million. On December 19, 2023, the Company entered into a securities purchase agreement with certain institutional investors named therein, pursuant to which the Company agreed to issue and sell, in a registered direct offering by the Company directly to the Investors an aggregate of 6,060,607 shares of the Company's common stock, \$0.00001 par value per share. The shares were sold to the Investors at a price per share of \$12.375 per share. The net proceeds from the Offering, after deducting offering expenses, were approximately \$74.4 million.

The Company had unrestricted cash and cash equivalents of \$139.7 million as of December 31, 2023.

On November 28, 2022, the Company entered into a loan agreement with General Motors Holdings LLC, an entity affiliated with General Motors LLC, which provides for a multi-draw senior secured term loan in an aggregate principal amount of up to \$100.0 million, available to the Company on a delayed draw basis beginning January 1, 2023 to September 30, 2023, subject to certain conditions precedent to funding. On September 28, 2023, the Company amended the GM Loan Agreement to extend the draw period for the delayed GM Loan to a period beginning on the date that is twelve months prior to the date agreed upon by the Company and GM for the start of production at an aerogel manufacturing facility in Bulloch County, Georgia (the Plant) and ending on March 31, 2024 (or any later date approved in writing by GM at its sole discretion); extend the maturity date of the GM Loan from March 31, 2025 to September 30, 2025; and add financial covenants measured starting from the fiscal quarter ending December 31, 2024 and at the end of each fiscal quarter thereafter.

The Company is increasing investment in the research and development of next-generation aerogel products and manufacturing process technologies. In addition, the Company has developed a number of promising aerogel products and technologies for the EV market. The Company believes that the commercial potential for the Company's products and technology in the EV market is significant. Accordingly, the Company is hiring additional personnel, incurring additional operating expenses, and incurring significant capital expenditures to expand silica aerogel manufacturing capacity, build an automated thermal barrier fabrication operation, enhance research and development laboratory facilities and equipment, and construct a battery materials facility, among other efforts.

The Company expects its existing cash balance will be sufficient to support current operating requirements, current research and development activities and the capital expenditures required to support the evolving commercial opportunity in the EV market and other strategic business initiatives. However, the Company plans to supplement its cash balance with equity financings, debt financings, equipment leasing, sale-leaseback transactions, customer prepayments, or government grant and loan programs to provide the additional capital necessary to purchase the capital equipment, construct the new facilities, establish the operations and complete the aerogel capacity expansions required to support these evolving commercial opportunities and strategic business initiatives.

(2) Summary of Basis of Presentation and Significant Accounting Policies

Principles of Consolidation

The accompanying condensed consolidated financial statements of the Company include the accounts of all its subsidiaries which are majority-owned, controlled by the Company or a variable interest entity ("VIE") where the Company is the primary beneficiary. All significant intercompany accounts and transactions have been eliminated in consolidation.

A VIE is an entity that lacks one or more of the characteristics of a voting interest entity. A VIE is defined as an entity in which equity investors do not have the characteristics of a controlling financial interest or do not have sufficient equity at risk for the entity to finance its activities without additional subordinated financial support from other parties. The Company consolidates a VIE in accordance with ASC 810, Consolidation ("ASC 810") when it is the primary beneficiary of such VIE. As primary beneficiary, the Company has both the power to direct the activities that most significantly impact the economic performance of the VIE and a right to receive benefits or absorb losses of the entity that could be potentially significant to the VIE. The Company is required to reconsider its evaluation of whether to consolidate a VIE each reporting period, based upon changes in the facts and circumstances pertaining to the VIE.

The Company evaluates the initial consolidation of each consolidated VIE, which includes a determination of whether the VIE constitutes the definition of a business in accordance with ASC 805, Business Combinations ("ASC 805"), by considering if substantially all of the fair value of the gross assets within the VIE are concentrated in either a single identifiable asset or group of single identifiable assets. Upon consolidation, the Company recognizes the assets acquired, the liabilities assumed, and any third-party ownership of membership interests as non-controlling interest as of the consolidation or acquisition date, measured at their relative fair values.

In April 2022, the Company engaged Prodensa Servicios de Consultora to establish OPE Manufacturer Mexico S de RL de CV, a maquiladora located in Mexico with the express purposes of manufacturing thermal barrier PyroThin products and ultimately operating an automated fabrication facility for PyroThin. OPE is currently owned by Prodensa, which charges a management fee though there is an option for OPE to be purchased by Aspen after a period of 18 months. During the period between inception and the exercise of the purchase option, OPE operations are consolidated within the Company financial statements as of and for the year ended December 31, 2023.

Use of Estimates

The preparation of the consolidated financial statements requires the Company to make a number of estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Significant items subject to such estimates and assumptions include allowances for doubtful accounts, sales returns and allowances, product warranty costs, inventory valuation, the carrying amount of property and equipment, right-of-use assets, lease liabilities, stock-based compensation, and deferred income taxes. The Company evaluates its estimates and assumptions on an on-going basis using historical experience and other factors, including current economic conditions, which are believed to be reasonable under the circumstances. Management adjusts such estimates and assumptions when facts and circumstances warrant. Illiquid credit markets, volatile equity markets, and declines in business investment can increase the uncertainty inherent in such estimates and assumptions. As future events and their effects cannot be determined with precision, actual results could differ significantly from these estimates. Changes in these estimates resulting from continuing changes in the economic environment will be reflected in the financial statements in future periods.

Cash and Cash Equivalents

Cash equivalents include short-term, highly liquid instruments, which consist of money market accounts and high-quality debt securities issued by the U.S. government via cash sweep accounts. All cash and cash equivalents are maintained with major financial institutions in North America. Deposits with this financial institution may exceed the amount of insurance provided on such deposits; however, these deposits typically may be redeemed upon demand and, therefore, bear minimal risk.

Restricted Cash

As of December 31, 2023, the Company had \$0.2 million of restricted cash to support its outstanding letters of credit.

Concentration of Credit Risk

Financial instruments, which potentially expose the Company to concentrations of credit risk, consist principally of accounts receivable. The Company's customers are primarily insulation distributors, insulation contractors, insulation fabricators and select energy and automotive end-users located throughout the world. The Company performs ongoing credit evaluations of its customers' financial condition and generally requires no collateral to secure accounts receivable. The Company maintains an allowance for doubtful accounts based on its assessment of the collectability of accounts receivable. The Company reviews the allowance for doubtful accounts quarterly. During the year ended December 31, 2023, the Company recorded a charge for estimated customer uncollectible accounts receivable of less than \$0.1 million. During the year ended December 31, 2022, the Company recorded a charge for estimated customer uncollectible accounts receivable of \$0.1 million. During the year ended December 31, 2021, the Company did not record any charges for uncollectible accounts receivable. Allowance for doubtful accounts was \$0.2 million and \$0.3 million at December 31, 2023 and 2022, respectively. The Company does not have any off-balance-sheet credit exposure related to its customers.

For the year ended December 31, 2023, two customers represented 41% and 14% of total revenue, respectively. For the year ended December 31, 2022, two customers represented 25% and 22% of total revenue, respectively. For the year ended December 31, 2021, one customer represented 28% of total revenue.

At December 31, 2023, the Company had two customers which accounted for 60% and 6% of accounts receivable, respectively. At December 31, 2022, the Company had two customers which accounted for 44% and 10% of accounts receivable, respectively.

Inventories

Inventory consists of finished products, work-in-process, and raw materials. Inventories are carried at lower of cost, determined using the first-in, first-out (FIFO) method, and net realizable value. Cost includes materials, labor and manufacturing overhead. Manufacturing overhead is allocated to the costs of conversion based on normal capacity of the Company's production facility. Abnormal freight, handling costs and material waste are expensed in the period it occurs.

The Company periodically reviews its inventories and makes provisions as necessary for estimated excess, obsolete or damaged goods to ensure values approximate the lower of cost and net realizable value. The amount of any such provision is equal to the difference between the cost of inventory and the estimated net realizable value based upon assumptions about future demand, selling prices and market conditions.

Prepaid expenses and other current assets

Prepaid expenses and other current assets primarily include value added tax and income tax receivables, prepayments of future services, and payments for pre-billed inventories.

Property, Plant and Equipment, Net

Property, plant and equipment are stated at cost. Expenditures for maintenance and repairs are charged to expense as incurred. Expenditures for major betterments are capitalized as additions to property, plant and equipment.

Depreciation on plant and equipment is calculated on the straight-line method over the estimated useful lives of the assets. Assets related to leasehold improvements are amortized on a straight-line basis over the shorter of the lease term or estimated useful life of the asset.

Assets utilized in the Company's operations that are taken out of service with no future use are charged to cost of revenue or operating expenses, depending on the department in which the asset was utilized. Impairments of construction in progress are charged to operating expenses upon the determination of no future use.

Other Assets

Other assets primarily include long-term deposits.

Impairment of Long-Lived Assets

Long-lived assets are reviewed for impairment when events or changes in circumstances indicate that the carrying amount of an asset or asset group may not be recoverable. Recognition and measurement of a potential impairment is performed on assets grouped with other assets and liabilities at the lowest level where identifiable cash flows are largely independent of the cash flows of other assets and liabilities. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset or asset group to future undiscounted net cash flows expected to be generated by the asset or asset group. If the carrying amount of an asset or asset group exceeds its estimated undiscounted future cash flows, an impairment charge is recognized for the amount by which the carrying amount of the asset or asset group exceeds the fair value of the asset or asset group. Fair value is determined through various valuation techniques including discounted cash flow models, quoted market values and third-party independent appraisals, as considered necessary.

Revenue Recognition

The Company recognizes revenue in accordance with Accounting Standards Codification 606, Revenue from Contracts with Customers (ASC 606). See note 3 for further details.

Warranty

The Company provides warranties for its products and records the estimated cost within cost of revenue in the period that the related revenue is recorded. The Company's standard warranty period extends to one year from the date of shipment. This standard warranty provides that the Company's products will be free from defects in material and workmanship, and will, under normal use, conform to the specifications for the product.

The Company's products may be utilized in systems that involve new technical demands and new configurations. Accordingly, the Company regularly reviews and assesses whether warranty reserves should be recorded in the period the related revenue is recorded. For an initial shipment of product for use in a system with new technical demands or new configurations and where the Company is unsure of meeting the customer's specifications, the Company will defer the recognition of product revenue and related costs until written customer acceptance is obtained.

The Company recorded warranty expense of \$0.5 million during the year ended December 31, 2023. The Company recorded warranty expense of \$0.2 million during the year ended December 31, 2022. The Company recorded warranty expense of less than \$0.1 million during the year ended December 31, 2021.

Shipping and Handling Costs

Shipping and handling costs are classified as a component of cost of revenue. Customer payments of shipping and handling costs are recorded as product revenue.

Stock-based Compensation

The Company grants share-based awards to its employees and non-employee directors. All share-based awards granted, including grants of stock options, restricted stock and restricted stock units (RSUs), are recognized in the statement of operations based on their fair value as of the date of grant. Expense is recognized on a straight-line basis over the requisite service period for all awards with service conditions. For performance-based awards, the grant date fair value is recognized as expense when the condition is probable of being achieved, and then on a graded basis over the requisite service period. The Company uses the Black-Scholes option-pricing model to determine the fair value of service-based option awards. The Black-Scholes model requires the use of a number of complex and subjective assumptions including fair value of the underlying security, the expected volatility of the underlying security, a risk-free interest rate and the expected term of the option.

The fair value of restricted stock and RSUs is determined using the closing price of the Company's common stock on the date of grant. All shares of restricted stock are not transferable until vested. Restricted stock is typically issued to non-employee directors and typically vests over a one-year period from the date of issuance. RSUs are issued to employees and typically vest over a three-year period from the date of issuance. The fair value of restricted stock and RSUs upon which vesting is solely service-based is expensed ratably over the vesting period. If the service condition for shares of restricted stock is not met for any reason, the shares of unvested restricted stock will be forfeited and returned to the Company.

For stock awards that contain a market condition, the Company uses the Monte-Carlo simulation model to determine the fair value of the awards. In

addition to the input assumptions used in the Black-Scholes model, the Monte-Carlo simulation model factors the probability that the specific market condition may or may not be satisfied into the valuation. Stock-based compensation expense for awards with a market condition is recognized on a straight-line basis over the requisite service period for each such award.

Research and Development

Costs incurred in the Company's research and development activities include compensation and related costs, services provided by third-party contractors, materials and supplies and are classified as research and development expenses as incurred.

Earnings per Share

The Company calculates net loss per common share based on the weighted-average number of common shares outstanding during each period. Potential common stock equivalents are determined using the treasury stock method. The weighted-average number of common shares included in the computation of diluted net income (loss) gives effect to all potentially dilutive common equivalent shares, including outstanding stock options and RSUs. Common equivalent shares are excluded from the computation of diluted net loss per share if their effect is antidilutive.

Income Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases and operating loss and tax credit carryforwards. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date.

The Company recognizes the effect of income tax positions only if those positions are more likely than not of being sustained. The Company accounts for uncertain tax positions using a recognition threshold and measurement attribute for the financial statement recognition and measurement of a tax position taken or expected to be taken in a tax return. Differences between tax positions taken in a tax return and amounts recognized in the financial statements are recorded as adjustments to income taxes payable or receivable, or adjustments to deferred taxes, or both. Changes in recognition or measurement are reflected in the period in which the change in judgment occurs. The Company recognizes penalties and interest related to uncertain tax positions, if any, as a component of income tax expense.

Segments

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 in making decisions on how to allocate resources and assess performance. The Company's chief operating decision maker is the Chief Executive Officer. The Company's chief operating decision maker reviews consolidated operating results to make decisions about allocating resources and assessing performance for the entire Company. The Company presently views its operations and manages its business as two operating segments.

Leases

The Company accounts for leases in accordance with FASB ASC Topic 842, Leases. The Company determines whether an arrangement is a lease at inception. For leases where the Company is the lessee, a lease liability and a right-of-use (ROU) asset is recognized for all leases, with the exception of short-term leases with terms of twelve months or less. ROU assets represent the Company's right to use an underlying asset for the lease term and lease liabilities represent the Company's payment obligations under the lease. Operating lease ROU assets and liabilities are recognized based on the present value of lease payments over the lease term. To measure its lease liabilities, the Company uses its incremental borrowing rate or the rate implicit in the lease, if available. The Company calculates its incremental borrowing rate using a synthetic credit rating analysis based on Moody's Building Materials Industry Rating Methodology. ROU assets also include any direct costs and prepaid lease payments but exclude any lease incentives received. The Company's lease terms may include options to extend or terminate the lease when it is reasonably certain that the Company will exercise that option. Lease expense for lease payments is recognized on a straight-line basis over the lease term.

The Company elected the short-term lease recognition exemption for all leases that qualify. For leases that qualify for this exemption, the Company does not recognize ROU assets or lease liabilities. For lease agreements with lease and non-lease components, the Company accounts for each component separately. However, in the case of equipment leases, the Company accounts for lease and non-lease components as a single component. Refer to Note 11. Leases for additional information.

Foreign Currency Transactions

The Company converts foreign currency transactions recognized in the Consolidated Statements of Operations to U.S. dollars by applying the exchange rate prevailing on the date of the transaction. Gains and losses arising from foreign currency transactions and the effects of remeasuring monetary assets and liabilities are recorded in general and administrative expenses, net in the Consolidated Statements of Operations.

Employee Retention Credits

In March 2020, the Coronavirus Aid, Relief, and Economic Security Act was signed into law, providing numerous tax provisions and other stimulus measures, including the Employee Retention Credit: a refundable tax credit against certain employment taxes. The Taxpayer Certainty and Disaster Tax Relief Act of 2020 and the American Rescue Plan Act of 2021 extended and expanded the availability of the Employee Retention Credits. We qualified for the Employee Retention Credits in the third and fourth quarters of 2020 and the first quarter of 2021. In September 2023, we submitted filings for CARES Employee Retention Credits totaling \$2.2 million that are reported in the accompanying condensed consolidated balance sheet within prepaid expenses and other current assets as of December 31, 2023, and in the accompanying statement of operations for the year ended December 31, 2023.

Recently Issued Accounting Standards

From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board or other standard setting bodies. Recently issued standards typically do not require adoption until a future effective date. Prior to their effective date, the Company evaluates the pronouncements to determine the potential effects of adoption to its consolidated financial statements.

Standards Implemented Since December 31, 2022

The Company has not implemented any accounting standards that had a material impact on its consolidated financial statements during the year ended December 31, 2023.

Standards to be Implemented After December 31, 2023

In November 2023, the Financial Accounting Standards Board (FASB) issued Accounting Standard Update (ASU) 2023-07 Segment Reporting (Topic 280) Improvements to Reportable Segment Disclosures to enhance disclosures about significant segment expenses. This ASU is effective for the Company's fiscal year 2024 and interim periods in fiscal year 2025. Early adoption is permitted. The Company is currently evaluating segment expense disclosures related to its annual report for fiscal year 2024.

In December 2023, the FASB issued ASU 2023-09 Income Taxes (Topic 740) Improvements to Income Tax Disclosures that requires disclosure of disaggregated income taxes paid, prescribes standard categories for the components of the effective tax rate reconciliation, and modifies other income tax-related disclosures. This ASU is effective for the Company's fiscal year 2025. Early adoption is permitted. The Company is currently evaluating income tax disclosures related to its annual report for fiscal year 2025. Although there are several other new accounting pronouncements issued by the FASB, the Company does not believe any of these accounting pronouncements had or will have a material impact on its Consolidated Financial Statements.

The Company believes that the impact of recently issued accounting standards that are not yet effective will not have a material impact on its consolidated financial statements.

(3) Revenue from Contracts with Customers

Revenue Recognition

Revenue is recognized when a customer obtains control of promised goods or services in an amount that reflects the consideration which the entity expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements within the scope of ASC 606, the Company performs the following five steps: (i) identification of the contract with a customer; (ii) identification of the performance obligations in the contract; (iii) determination of the transaction price; (iv) allocation of the transaction price to the separate performance obligations in the contract; and (v) recognition of the revenue associated with performance obligations as they are satisfied. The Company applies the five-step model to contracts when it is probable that the Company will collect the consideration it is entitled to in exchange for the goods or services it transfers to the customer. At contract inception, once the contract is determined to be within the scope of ASC 606, the Company assesses the goods or services promised within each contract and determines those that are

performance obligations and assesses whether each promised good or service is distinct. If the contract contains a single performance obligation, the entire transaction price is allocated to the single performance obligation. Contracts that contain multiple performance obligations require an allocation of the transaction price based on the estimated relative standalone-selling prices of the promised products or services underlying each performance obligation. The Company determines standalone-selling prices based on the price at which the performance obligation is sold separately. If the standalone-selling price is not observable through past transactions, the Company estimates the standalone-selling price considering available information such as market conditions and internally approved pricing guidelines related to the performance obligations. The Company then recognizes as revenue the amount of the transaction price that is allocated to the respective performance obligation when (or as) the performance obligation is satisfied.

When determining the transaction price of a contract, an adjustment is made if payment from a customer occurs either significantly before or significantly after performance, resulting in a significant financing component. Applying the practical expedient in paragraph ASC 606-10-32-18, the Company does not assess whether a significant financing component exists if the period between when the Company performs its obligations under the contract and when the customer pays is one year or less. The Company did not have any contracts outstanding at both December 31, 2023 and December 31, 2022 and did not enter into any contracts during each of the years ended December 31, 2023 and 2022 that contained a significant financing component.

The Company records deferred revenue for product sales when (i) the Company has delivered products, but other revenue recognition criteria have not been satisfied, or (ii) payments have been received in advance of the completion of required performance obligations.

Energy Industrial

The Company generally enters into contracts containing one type of performance obligation. For a majority of the contracts, the Company recognizes revenue at a point in time when transfer of control of the products is passed to the customer, which is generally upon delivery according to contractual shipping terms within customer purchase orders. For a limited number of customer arrangements for customized products with no alternative use to the Company and an enforceable right to payment for progress completed to date, the Company recognizes revenue over time using units of production to measure progress toward satisfying the performance obligations. Units of production represent work performed as we do not generate significant work in process and thereby best depicts the transfer of control to the customer. Customer invoicing terms for contracts for which revenue is recognized under the over time methodology are typically based on certain milestones within the production and delivery schedule. The timing of revenue recognition is assessed on a contract-by-contract basis.

The Company also enters into rebate agreements with certain customers. These agreements may be considered an additional performance obligation of the Company or variable consideration within a contract. Rebates are recorded as a reduction of revenue in the period the related revenue is recognized. A corresponding liability is recorded as a component of deferred revenue on the consolidated balance sheets. These arrangements are primarily based on the customer attaining contractually specified sales volumes.

The Company estimates the amount of its sales that may be returned by its customers and records this estimate as a reduction of revenue in the period the related revenue is recognized. The Company currently estimates return liabilities using historical rates of return, current quarter credit sales, and specific items of exposure on a contract-by-contract basis. Sales return reserves were approximately \$0.2 million and \$0.1 million at December 31, 2023 and December 31, 2022, respectively.

Thermal Barriers

The Company supplies fabricated, multi-part thermal barriers for use in battery packs in the EV market. These thermal barriers are customized to meet customer specifications. Although thermal barrier products are customized with no alternative use to the Company, the Company does not always have an enforceable right to payment. Under the provisions of ASC 606, the Company recognizes revenue at a point in time when transfer of the control of the products is passed to the customer according to the terms of the contract, including under bill and hold arrangements. The timing of revenue recognition is assessed on a contract-by-contract basis.

Shipping and Handling Costs

Shipping and handling costs associated with outbound freight after control over a product has transferred to a customer are accounted for as fulfillment costs and are included in the cost of product revenue. The associated amount of revenue recognized includes the consideration to which the Company expects to be entitled to receive in exchange for incurring these shipping and handling costs.

Disaggregation of Revenue

In the following tables, revenue is disaggregated by primary geographical region and source of revenue:

| | December 31, 2023 | | |
|----------------------------|-------------------|---------------------------------|-------------------|
| | U.S. | International (In thousands) | Total |
| Geographical region | | | |
| Asia | \$ — | \$ 35,698 | \$ 35,698 |
| Canada | — | 2,033 | 2,033 |
| Europe | — | 42,731 | 42,731 |
| Latin America | — | 7,219 | 7,219 |
| U.S. | 151,037 | — | 151,037 |
| Total revenue | <u>\$ 151,037</u> | <u>\$ 87,681</u> | <u>\$ 238,718</u> |
| Source of revenue | | | |
| Energy industrial | \$ 52,838 | \$ 75,801 | \$ 128,639 |
| Thermal barrier | 98,199 | 11,880 | 110,079 |
| Total revenue | <u>\$ 151,037</u> | <u>\$ 87,681</u> | <u>\$ 238,718</u> |

| | December 31, 2022 | | |
|----------------------------|-------------------|---------------------------------|-------------------|
| | U.S. | International (In thousands) | Total |
| Geographical region | | | |
| Asia | \$ — | \$ 34,746 | \$ 34,746 |
| Canada | — | 4,947 | 4,947 |
| Europe | — | 22,239 | 22,239 |
| Latin America | — | 4,464 | 4,464 |
| U.S. | 113,968 | — | 113,968 |
| Total revenue | <u>\$ 113,968</u> | <u>\$ 66,396</u> | <u>\$ 180,364</u> |
| Source of revenue | | | |
| Energy industrial | \$ 64,699 | \$ 60,108 | \$ 124,807 |
| Thermal barrier | 49,269 | 6,288 | 55,557 |
| Total revenue | <u>\$ 113,968</u> | <u>\$ 66,396</u> | <u>\$ 180,364</u> |

| | December 31, 2021 | | |
|----------------------------|-------------------|---------------------------------|-------------------|
| | U.S. | International (In thousands) | Total |
| Geographical region | | | |
| Asia | \$ — | \$ 19,383 | \$ 19,383 |
| Canada | — | 2,985 | 2,985 |
| Europe | — | 27,924 | 27,924 |
| Latin America | — | 4,493 | 4,493 |
| U.S. | 66,837 | — | 66,837 |
| Total revenue | <u>\$ 66,837</u> | <u>\$ 54,785</u> | <u>\$ 121,622</u> |
| Source of revenue | | | |
| Energy industrial | \$ 60,299 | \$ 54,659 | \$ 114,958 |
| Thermal barrier | 6,538 | 126 | 6,664 |
| Total revenue | <u>\$ 66,837</u> | <u>\$ 54,785</u> | <u>\$ 121,622</u> |

Contract Balances

The following table presents changes in the Company's contract assets and contract liabilities during the year ended December 31, 2023:

| | Balance at December 31, 2022 | Additions | Deductions | Balance at December 31, 2023 |
|----------------------------|------------------------------------|------------------|--------------------|------------------------------------|
| | (In thousands) | | | |
| Contract assets | | | | |
| Thermal barrier | 143 | — | (143) | — |
| Total contract assets | <u>\$ 143</u> | <u>\$ -</u> | <u>\$ (143)</u> | <u>\$ —</u> |
| Contract liabilities | | | | |
| Deferred revenue | | | | |
| Energy industrial | \$ 5,846 | \$ 17,484 | \$ (21,014) | \$ 2,316 |
| Total contract liabilities | <u>\$ 5,846</u> | <u>\$ 17,484</u> | <u>\$ (21,014)</u> | <u>\$ 2,316</u> |

During the year ended December 31, 2023, the Company recognized \$5.8 million of revenue that was included in deferred revenue at December 31, 2022.

A contract asset is recorded when the Company satisfies a performance obligation by transferring a promised good or service and has earned the right to consideration from its customer. These assets may represent a conditional right to consideration and are included within accounts receivable on the consolidated balance sheets.

A contract liability is recorded when consideration is received, or such consideration is unconditionally due, from a customer prior to transferring goods or services under the terms of the contract. Contract liabilities are recognized as revenue after control of the products or services is transferred to the customer and all revenue recognition criteria have been met.

(4) Inventories

Inventories consist of the following:

| | December 31, | |
|-----------------|------------------|------------------|
| | 2023 | 2022 |
| | (In thousands) | |
| Raw material | \$ 24,735 | \$ 19,876 |
| Work in process | 7,936 | 2,204 |
| Finished goods | 6,518 | 458 |
| Total | <u>\$ 39,189</u> | <u>\$ 22,538</u> |

(5) Property, Plant and Equipment, Net

Property, plant and equipment consist of the following:

| | December 31, | | Useful life |
|---|-------------------|-------------------|--------------------------------------|
| | 2023 | 2022 | |
| | (In thousands) | | |
| Construction in progress | \$ 314,695 | \$ 209,056 | — |
| Buildings | 25,473 | 24,016 | 30 years |
| Machinery and equipment | 185,339 | 136,607 | 3 — 10 years |
| Computer equipment and software | 9,495 | 10,239 | 3 years |
| Leasehold improvements | 23,514 | 9,226 | Shorter of useful life or lease term |
| Total | 558,516 | 389,144 | |
| Accumulated depreciation and amortization | (141,289) | (129,921) | |
| Property, plant and equipment, net | <u>\$ 417,227</u> | <u>\$ 259,223</u> | |

Depreciation expense was \$15.3 million, \$9.2 million and \$9.4 million for the years ended December 31, 2023, 2022 and 2021, respectively.

Construction in progress totaled \$314.7 million and \$209.1 million at December 31, 2023 and 2022, respectively. The balance at December 31, 2023 and 2022 included engineering designs and construction costs totaling \$279.7 million and \$164.5 million, respectively, for a planned aerogel manufacturing facility in Bulloch County, Georgia. The Company incurred \$6.1 million and \$2.7 million in capitalized interest for the years ended December 31, 2023 and December 31, 2022, respectively, for the construction in progress in Bulloch County, Georgia.

(6) Accrued Expenses

Accrued expenses consist of the following:

| | December 31, | |
|------------------------|------------------|------------------|
| | 2023 | 2022 |
| | (In thousands) | |
| Employee compensation | \$ 16,876 | \$ 12,467 |
| Other accrued expenses | 5,935 | 3,536 |
| Total | <u>\$ 22,811</u> | <u>\$ 16,003</u> |

(7) Revolving Line of Credit

The Company was party to the Second Amended and Restated Loan and Security Agreement with Silicon Valley Bank (Loan Agreement). On March 12, 2021, the Loan Agreement was amended and restated to extend the maturity date of the revolving credit facility to April 28, 2022 and to establish financial covenants on certain minimum Adjusted EBITDA levels and minimum Adjusted Quick Ratio covenants, each as defined in the Loan Agreement. At various dates in 2021, and subsequently on March 31, 2022, April 28, 2022, June 23, 2022, August 26, 2022 and October 14, 2022, the Company entered into amendments to the Loan Agreement to revise certain financial covenants, among other things. On November 28, 2022, the Company terminated the Loan Agreement with Silicon Valley Bank.

As of both December 31, 2022 and 2023, the Company had no amounts drawn from the revolving credit facility.

(8) Related Party Transactions

Convertible Note

During the year ended December 31, 2022, the Company issued a \$100.0 million aggregate principal amount convertible note to Wood River Capital, LLC, an entity affiliated with Koch Strategic Platforms, LLC (the 2022 Convertible Note). Refer to note 9 for more information.

Common Stock Sales

On June 29, 2021, the Company sold 3,462,124 shares of common stock to Spring Creek Capital, LLC, an entity affiliated with Koch Strategic Platforms, LLC, in a private placement of our common stock and received net proceeds of \$73.5 million after deducting fees and offering expenses of \$1.5 million.

On March 28, 2022, the Company sold 1,791,986 shares of common stock to Wood River Capital, LLC, an entity affiliated with Koch Strategic Platforms, LLC, at a purchase price equal to \$27.902 per share, for aggregate gross proceeds of approximately \$50.0 million.

On November 28, 2022, the Company sold 10,526,316 shares of common stock to Wood River Capital, LLC, an entity affiliated with Koch Strategic Platforms, LLC, at a purchase price equal to \$9.50 per share, for aggregate gross proceeds of approximately \$100.0 million, in an underwritten offering of common stock.

Other

During the year ended December 31, 2023, the Company recorded costs of \$8.6 million as a component of construction in process in connection with the

planned aerogel manufacturing facility in Bulloch County, Georgia in fees from an entity affiliated with Koch Disruptive Technologies, LLC for project management service. The Company had \$2.8 million in accounts payable as of December 31, 2023 due to the entity affiliated with Koch Disruptive Technologies, LLC.

During the year ended December 31, 2022, the Company recorded costs of \$8.9 million as a component of construction in progress in connection with the planned aerogel manufacturing facility in Bulloch County, Georgia in fees from an entity affiliated with Koch Strategic Platforms, LLC for project management services.

During the year ended December 31, 2022, the Company sold 135,870 shares of its common stock to Robert M. Gervis, a director of the Company at the time, in the Company's at-the-market offering pursuant to a sales agreement, dated March 16, 2022, by and among the Company and Cowen and Company, LLC and Piper Sandler & Co. (the Sales Agreement), for net proceeds of \$4.4 million.

(9) Convertible Note - Related Party

2022 Convertible Note

On February 15, 2022, the Company entered into a note purchase agreement (the Note Purchase Agreement) with Wood River Capital LLC, an entity affiliated with Koch Strategic Platforms, LLC (Koch), relating to the issuance and sale to Koch of the 2022 Convertible Note in the aggregate principal amount of \$100.0 million. The transactions contemplated by the Note Purchase Agreement closed on February 18, 2022 (the Issue Date). The maturity date of the 2022 Convertible Note is February 18, 2027, subject to earlier conversion, redemption, or repurchase.

The 2022 Convertible Note is a senior unsecured obligation of the Company and ranks equal in right of payment to all senior unsecured indebtedness of the Company, and will rank senior in right of payment to any indebtedness that is contractually subordinated to the 2022 Convertible Note.

In accordance with ASU 2020-06, the 2022 Convertible Note is accounted for as a single unit of account and consists of the following:

| | December 31, 2023 | December 31, 2022 |
|--|----------------------|----------------------|
| Convertible note, principal | \$ 100,000 | \$ 100,000 |
| Payment in-kind | 18,318 | 7,830 |
| Discount on convertible note | (3,209) | (4,097) |
| Debt issuance costs, net of accumulated amortization | (117) | (153) |
| Convertible note | <u>\$ 114,992</u> | <u>\$ 103,580</u> |

In general, fair values determined by Level 1 inputs utilize observable inputs such as quoted prices in active markets for identical assets or liabilities. Fair values determined by Level 2 inputs utilize data points that are either directly or indirectly observable, such as quoted prices for similar instruments in active markets, interest rates and yield curves. Fair values determined by Level 3 inputs utilize unobservable data points in which there is little or no market data, which require the Company to develop its own assumptions for the asset or liability. The 2022 Convertible Note does not have current observable inputs such as recent trading prices (Level 3) and is measured at fair value using a combination of option pricing and discounted cash flow models and incorporate management's assumptions for stock price, volatility and risk rate.

The Company estimated the fair value of the 2022 Convertible Note is approximately \$118.2 million as of December 31, 2023. However, as the Company has not elected to utilize the fair value option, it is carried at amortized cost of \$115.0 million.

Contractual Interest Rates

The 2022 Convertible Note was issued at par and bears interest at the Secured Overnight Financing Rate (SOFR) plus 5.50% per annum if interest is paid in cash, or, if interest is paid in-kind as an increase in the principal amount of the outstanding note, at the SOFR plus 6.50% per annum. Under the terms of the 2022 Convertible Note, SOFR has a floor of 1% and a cap of 3%. Interest on the 2022 Convertible Note is payable semi-annually in arrears on June 30 and December 30. The Company, at its option, is permitted to settle each semi-annual interest payment in cash, in-kind, or any combination thereof. It is expected that the Notes will mature on February 18, 2027, subject to earlier conversion, redemption or repurchase.

The Company elected to repay the contractual interest due on June 30, 2022, December 30, 2022, June 30, 2023, and December 30, 2023 in-kind as an increase to the principal amount of \$2.9 million, \$4.9 million, \$5.1 million, and \$5.4 million respectively. The contractual interest attributable to the 2022 Convertible Note was recorded as an addition to the convertible note – related party balance on the condensed consolidated balance sheets.

During the year ended December 31, 2023, the Company incurred \$10.5 million of interest from the 2022 Convertible Note, of which \$6.1 million was capitalized as part of the construction in progress for the planned manufacturing facility in Bulloch County, Georgia. The Company paused the capitalization of interest related to the manufacturing facility being constructed in Bulloch County, Georgia during the year ended December 31, 2023, as a result of the intentional slow down in construction. During the year ended December 31, 2022, the Company incurred \$7.8 million of interest from the 2022 Convertible Note, of which \$2.7 million was capitalized as part of the construction in progress for the planned manufacturing facility in Bulloch County, Georgia.

Debt issuance costs comprised less than \$0.2 million for the year ended December 31, 2023. The effective interest rate approximated the contract interest rate for the year ended December 31, 2023.

Conversion Rights

On November 28, 2022, the Company entered into an amendment to the Convertible Note with Wood River Capital, LLC to reduce the initial Conversion Price by \$5.00 per share from \$34.936625 per share to \$29.936625 per share, by increasing the initial Conversion Rate from 28.623257 shares per \$1,000 of Capitalized Principal Amount to 33.400100 shares per \$1,000 of Capitalized Principal Amount under the Convertible Note. Accordingly, the 2022 Convertible Note is convertible at the option of the holder at any time prior to the business day immediately preceding the maturity date at an initial conversion rate of 33.400100 shares of the Company's common stock per \$1,000 of capitalized principal. The effective conversion price is approximately \$29.936625 per share (the Conversion Price). The Conversion Price is subject to adjustment upon the occurrence of certain dilutive events such as stock splits and combinations, stock dividends, mergers and spin-off. As of December 31, 2023, 3,951,833 shares of the Company's common stock were issuable upon conversion of the 2022 Convertible Note. The Company has the right to settle conversions in shares of common stock, cash, or any combination thereof. If the closing price per share of the Company's common stock on the New York Stock Exchange is at least 130% of the Conversion Price for 20 consecutive trading days, the Company may elect to convert the principal and accrued interest owing under the Notes, plus a make-whole amount equal to the sum of the present values of the remaining interest payments that would have otherwise been payable from the date of such conversion, redemption or repurchase, as applicable, through maturity (the Make-Whole Amount), into the Company's common stock at the Conversion Price.

Optional Redemption

The 2022 Convertible Note is redeemable at the Company's option at any time and in the event that the volume weighted average price of the Company's common stock for the 10 trading days immediately preceding the date on which the Company provides the redemption notice has been at least 130% of the Conversion Price then in effect at a redemption price of 100% of the principal amount, plus accrued and unpaid interest (excluding the redemption date), plus the Make-Whole Amount.

Contingent Redemption

Upon the occurrence of certain fundamental changes described in the Indenture (each, a Fundamental Change), the Holder of the Note may require that the Company repurchase all or part of the principal amount of the Note at a purchase price of 100% of the principal amount of such Note, plus accrued and unpaid interest to, but excluding, the Fundamental Change repurchase date, plus the Make-Whole Amount. The Indenture includes customary "events of default," which may result in the acceleration of the maturity of the Note.

Embedded Derivatives

The Company determined that the Make-Whole feature of the 2022 Convertible Note requires bifurcation in accordance with Accounting Standards Codification 815, Derivatives and Hedging (ASC 815). Accordingly, the Company must separately account for the feature at fair value with changes in fair value reported in current period earnings. The fair value of the Make-Whole was determined to be immaterial as of February 18, 2022, December 31, 2022, and December 31, 2023.

(10) Other Income (Expense)

Interest

For the years ended December 31, 2023, and 2022, interest expense on the related party convertible note was \$5.3 million and \$5.1 million, respectively and interest income, net, of \$6.5 million and \$1.6 million, respectively, are primarily related to interest earned on unrestricted cash and cash equivalents. For the year ended December 2021, interest expense, net was \$3.5 million, and consisted primarily of fees and interest expense related to the Company's revolving credit facility with Silicon Valley Bank.

Employee Retention Credits

The CARES Act provides an employee retention credit (CARES Employee Retention Credit), which is a refundable tax credit against certain employment taxes of up to \$5,000 per employee for eligible employers. The tax credit is equal to 50% of qualified wages paid to employees during a quarter, capped at \$10,000 of qualified wages per employee through December 31, 2020. Additional relief provisions were passed by the United States government, which extend and slightly expand the qualified wage caps on these credits through December 31, 2021. Based on these additional provisions, the tax credit is now equal to 70% of qualified wages paid to employees during a quarter, and the limit on qualified wages per employee has been increased to \$10,000 of qualified wages per quarter. The Company qualified for the tax credit under the CARES Act for qualified wages for the years ended December 31, 2020 and 2021. In September 2023, the Company submitted filings for CARES Employee Retention Credits totaling \$2.2 million that are reported in the accompanying condensed consolidated balance sheet within prepaid expenses and other current assets as of December 31, 2023, and in the accompanying statement of operations for the year ended December 31, 2023.

(11) Leases

The Company leases office, laboratory, warehouse and fabrication space in Massachusetts, Rhode Island and Monterrey, Mexico under operating leases. Under these agreements, the Company is obligated to pay annual rent, real estate taxes, and certain other operating expenses. The Company also leases equipment under operating leases. The Company's operating leases expire at various dates through 2034.

During 2016, the Company entered into an agreement to extend its lease of approximately 51,650 square feet of office space in Northborough, Massachusetts. The lease commenced on January 1, 2017 and will expire on December 31, 2031. The annual base rent associated with the lease was \$478,000 during 2023 and is increasing by approximately 3% annually for the term of the lease. The lease also requires the payment by the Company of its pro rata share of real estate taxes and certain other expenses. Prior to the expiration of the lease, the Company will have the right to extend the lease for an additional term of five years.

Under the terms of the lease extension, the landlord provided the Company with an allowance of \$1.2 million to be utilized for improvements to the leased premises. These amounts were considered a lease incentive and were excluded from the Company's ROU assets upon its adoption of ASU 2016-02 on January 1, 2019 (see note 11). At December 31, 2023 and 2022, the Company had capitalized \$1.2 million in associated leasehold improvement costs.

The Company incurred operating lease costs of \$5.3 million and \$4.0 million during the years ended December 31, 2023 and 2022, respectively. Cash payments related to operating lease liabilities were \$4.9 million and \$3.6 million during the years ended December 31, 2023 and 2022, respectively. At December 31, 2023, the weighted average remaining lease term for operating leases was 9.0 years. At December 31, 2023, the weighted average discount rate for operating leases was 12.0%.

Maturities of operating lease liabilities at December 31, 2023 are as follows:

| Year | Operating Leases (In thousands) |
|-------------------------|--|
| 2024 | \$ 4,531 |
| 2025 | 4,373 |
| 2026 | 4,064 |
| 2027 | 3,793 |
| 2028 | 3,946 |
| Thereafter | 19,174 |
| Total lease payments | 39,881 |
| Less imputed interest | (16,101) |
| Total lease liabilities | \$ 23,780 |

As of December 31, 2023, the Company had no additional operating real estate or equipment leases that would commence during 2024.

(12) Commitments and Contingencies

Cloud Computing Agreement

The Company is party to a cloud computing agreement that is a service contract for enterprise resource planning software. The agreement has a three-year term beginning on January 15, 2021, with option to renew. During the year ended December 31, 2023, the Company capitalized \$1.3 million of costs related to implementation of the software that began to amortize during 2022 with a five year expected life. The capitalized implementation costs are classified on the consolidated balance sheets as follows:

| | December 31, 2023 | December 31, 2022 |
|--|----------------------|----------------------|
| | (In thousands) | |
| Cloud computing costs included in other current assets | \$ 420 | \$ 420 |
| Cloud computing costs included in other assets | 1,590 | 1,590 |
| Amortization of cloud computing costs | (662) | (242) |
| Total capitalized cloud computing costs | <u>\$ 1,348</u> | <u>\$ 1,768</u> |

Thermal Barrier Contract

The Company is party to production contracts with GM to supply fabricated, multi-part thermal barriers (Barriers) for use in the battery system of its next-generation EVs (Contracts). Pursuant to the Contracts, the Company is obligated to supply Barriers at fixed annual prices and at volumes to be specified by the OEM up to a daily maximum quantity through the respective terms of the agreements, which expire at various times from 2026 through 2034. While the OEM has agreed to purchase its requirement for Barriers from the Company for locations to be designated from time to time by the OEM, it has no obligation to purchase any minimum quantity of Barriers under the Contracts. In addition, the OEM may terminate the Contracts any time and for any or no reason. All other terms of the Contracts are generally consistent with the OEM's standard purchase terms, including quality and warranty provisions that are customary in the automotive industry.

Letters of Credit

The Company has provided certain customers with letters of credit securing obligations under commercial contracts. As of December 31, 2023, the Company had \$0.2 million of restricted cash to support our outstanding letters of credit. The Company had letters of credit outstanding of \$1.2 million at December 31, 2022. These letters of credit were secured by the Company's revolving credit facility (see note 7). On November 28, 2022, we terminated the Loan Agreement with Silicon Valley Bank.

Litigation

The Company is, from time to time, a party to litigation that arises in the normal course of its business operations. See Part I, Item 3 ("Legal Proceedings") of this Annual Report on Form 10-K for a description of certain of the Company's current legal proceedings. The Company is not presently a party to any litigation for which it believes a loss is probable requiring an amount to be accrued or a possible loss contingency requiring disclosure.

Purchase Commitments

As of December 31, 2023, the Company had purchase commitments of approximately \$267.3 million, which included capital commitments of \$202.6 million. Purchase commitments related to capital expenditures are anticipated to be spent over the next three years, while the Company's remaining purchase commitments are anticipated to be spent throughout 2024.

Purchase obligations relate primarily to open purchase orders for capital expenditures, inventories, and goods and services. Purchase obligations are entered into with various vendors in the normal course of business and are consistent with the Company's expected requirements.

(13) Stockholders' Equity

At December 31, 2023 and 2022, the Company was authorized to issue 255,000,000 shares of stock, of which 250,000,000 shares were designated as common stock and 5,000,000 shares were designated as preferred stock.

(14) Employee Benefit Plan

The Company sponsors the Aspen Aerogels, Inc. 401(k) Plan. Under the terms of the plan, the Company's employees may contribute a percentage of their pretax earnings. During the year ended December 31, 2023, 2022, and 2021, the Company provided matching contributions of \$1.5 million, \$1.2 million, and \$0.3 million, respectively.

(15) Employee Stock Ownership Plans

Effective June 12, 2014, the Company adopted the 2014 Employee, Director and Consultant Equity Incentive Plan (the 2014 Equity Plan). Under the 2014 Equity Plan, the Company was authorized to grant incentive stock options (ISOs), non-qualified stock options (NSOs), restricted stock, restricted stock units (RSUs) and other stock-based awards. Stock options under the 2014 Equity Plan were granted with an exercise price not less than the fair market value of the Company's common stock at the date of grant.

The 2023 Equity Plan was approved by stockholders at the Company's annual meeting of stockholders on June 1, 2023 as the successor to the 2014 Equity Plan, and no further awards may be made under the 2014 Equity Plan after that date. Under the 2023 Equity Plan, the Company may grant ISOs, NSOs, restricted stock, RSUs and other stock-based awards. Stock options under the 2023 Equity Plan are to be granted with an exercise price not less than the fair market value of the Company's common stock at the date of grant. Equity awards granted to employees generally vest over a service period of three to four years. Restricted stock and stock options granted to nonemployee directors generally vest over a one-year service period.

As of December 31, 2023, 5,808,440 shares of common stock were reserved for issuance upon the exercise or vesting of outstanding stock-based awards granted under the Company's equity incentive plans. Any cancellations or forfeitures of awards outstanding under the 2023 Equity Plan, the 2014 Equity Plan or the 2001 Equity Incentive Plan, as amended (the 2001 Equity Plan) will result in the shares reserved for issuance pursuant to such awards becoming available for grant under the 2023 Equity Plan. As of December 31, 2023, the Company has either reserved in connection with statutory tax withholdings or issued a total of 5,173,760 shares under the Company's equity incentive plans. As of December 31, 2023, there were 2,139,794 shares of common stock available for future grant under the 2023 Equity Plan.

During the year ended December 31, 2023, the Company granted 523,783 restricted common stock units (RSUs) with a grant date fair value of \$4.6 million and non-qualified stock options (NSOs) to purchase 1,974,978 shares of common stock with a grant date fair value of \$9.7 million to employees under its equity incentive plans. The RSUs and NSOs granted to employees will vest over a three-year period from the applicable vesting commencement date. During the year ended December 31, 2023, the Company also granted 44,928 shares of restricted common stock with a grant date fair value of \$0.3 million and NSOs to purchase 46,272 shares of common stock with a grant date fair value of \$0.2 million to its non-employee directors under the 2023 Equity Plan. The restricted common stock and NSOs granted to non-employee directors vest upon the earlier of the date that is the one-year anniversary of the grant date or the day prior to the Company's annual meeting of stockholders to be held in 2024.

On June 29, 2021, the Company also awarded 461,616 shares of restricted common stock to its chief executive officer with vesting subject to the achievement of certain volume weighted average common stock price targets, over a three-to-five year period. The award had an aggregate grant date fair value of \$6.5 million.

On June 2, 2022, the Company issued 53,590 shares of restricted common stock, pursuant to a performance-based restricted stock agreement, to each of certain employees, with vesting in tranches, subject to achievement of certain time and performance vesting conditions, as defined, over a three-to-five year period. The equity awards had a total aggregate fair value of \$4.0 million at the time of grant.

Stock-based compensation is included in cost of sales or operating expenses, as applicable, and consists of the following:

| | Year Ended December 31, | | |
|-------------------------------------|-------------------------|----------|----------|
| | 2023 | 2022 | 2021 |
| | (In thousands) | | |
| Cost of product revenue | \$ 583 | \$ 931 | \$ 510 |
| Research and development expenses | 799 | 1,166 | 750 |
| Sales and marketing expenses | 1,484 | 1,883 | 822 |
| General and administrative expenses | 8,088 | 5,405 | 3,094 |
| Total stock-based compensation | \$ 10,954 | \$ 9,385 | \$ 5,176 |

Stock Options Valuation and Amortization Method

The fair value of each stock option is estimated as of the date of grant using the Black-Scholes option-pricing model. Key inputs into this formula included expected term, expected volatility, expected dividend yield and the risk-free rate. Each assumption is set forth and discussed below.

The Company used a Monte-Carlo Simulation model to estimate the original grant date fair value of the CEO Options as well as the subsequent modifications. The simulation model was based on the Black-Scholes option-pricing model and a number of complex assumptions including (i) whether the vesting condition is satisfied within the time-vesting periods, and (ii) the date the common stock price target is met per the terms of the agreement.

For stock options with a service condition, the fair value is amortized on a straight-line basis over the requisite service period of the options, which is generally a three-year vesting period from the date of grant.

Expected Term

The expected term represents the period that the Company's stock-based awards are expected to be outstanding. The Company does not have sufficient historical exercise data to provide a reasonable basis upon which to estimate the expected term. Accordingly, the Company uses the simplified method to calculate the expected term for options granted.

Expected Volatility

In 2023, 2022 and 2021, the Company used its historical volatility as a basis to estimate expected volatility in the valuation of stock options.

Expected Dividend

The Company uses an expected dividend yield of zero. The Company does not intend to pay cash dividends on its common stock in the foreseeable future, nor has it paid dividends on its common stock in the past.

Risk-free Interest Rate

The Company uses a risk-free interest rate based on U.S. Treasury zero-coupon issues with a remaining term equal to the expected life assumed at the date of grant.

Estimated Forfeitures

The Company records the impact of forfeitures of service-based awards under the provisions of ASU 2016-09 at the time an award is forfeited.

Assumptions Utilized

The following information relates to the fair value of the option awards estimated by use of the Black-Scholes option-pricing model:

| | Year Ended December 31, | | |
|--|-------------------------|--------------|---------------|
| | 2023 | 2022 | 2021 |
| Weighted average assumptions: | | | |
| Expected term (in years) | 6.12 | 5.97 | 5.96 |
| Expected volatility | 70.04 % | 61.85 % | 59.80 % |
| Risk free rate | 4.08 % | 2.13 % | 0.86 % |
| Expected dividend yield | 0.00 % | 0.00 % | 0.00 % |
| Weighted average fair value: | | | |
| Grant-date fair value of options granted | \$ 4.91 | \$ 14.20 | \$ 14.28 |
| Grant-date fair value of options vested | \$ 9.63 | \$ 5.06 | \$ 2.91 |
| Aggregate intrinsic value of options exercised | \$ 1,652,567 | \$ 1,306,245 | \$ 12,675,489 |

Outstanding Options

The following table summarizes information about stock options outstanding:

| | Number of Shares | Weighted Average Grant Date Fair Value Per Share | Weighted Average Exercise Price Per Share | Weighted Average Remaining Contractual Term (Years) | Aggregate Intrinsic Value |
|--|---------------------|--|---|--|---------------------------------|
| (\$ in thousands, except share and per share data) | | | | | |
| Options outstanding at December 31, 2022 | 3,904,080 | \$ 7.12 | \$ 11.37 | 5.26 | \$ 16,486,864 |
| Granted | 2,021,250 | \$ 4.91 | \$ 7.46 | | |
| Forfeited | (300,788) | \$ 10.18 | \$ 17.25 | | |
| Expired | (66,846) | \$ 98.27 | \$ 82.78 | | |
| Exercised | (323,502) | \$ 2.59 | \$ 5.13 | | \$ 1,652,567 |
| Options outstanding at December 31, 2023 | 5,234,194 | \$ 5.21 | \$ 8.99 | 6.13 | \$ 41,225,602 |
| Exercisable at December 31, 2023 | 3,002,950 | \$ 4.58 | \$ 8.52 | 6.13 | \$ 24,797,684 |
| Expected to vest at December 31, 2023 | 2,231,244 | \$ 6.07 | \$ 9.62 | 2.09 | \$ 16,427,918 |

As of December 31, 2023, total unrecognized compensation cost related to non-vested service-based options granted under the Company's equity incentive plans was \$9.7 million. The unrecognized compensation cost for the service-based options is expected to be recognized over a weighted average period of 2.09 years.

Restricted Stock Awards and Restricted Stock Units

The Company values restricted stock awards and RSUs based on the closing price of our shares on the date of grant. RSUs have time-based vesting conditions and typically vest over three or four years. Restricted stock awards issued to nonemployee directors generally vest in full one year from the date of grant.

During the year ended December 31, 2021, the Company also awarded 461,616 shares of restricted common stock to its chief executive officer with vesting subject to the achievement of certain volume weighted average common stock price targets, over a three-to-five year period. The Company valued the shares using a Monte-Carlo simulation model to estimate the grant date fair value utilizing an expected volatility of 59.3% and a risk free rate of 0.89%.

On June 2, 2022, the Company issued 53,590 shares of restricted common stock, pursuant to a performance-based restricted stock agreement, to each of certain employees, with vesting in tranches, subject to achievement of certain time and performance vesting conditions, as defined, over a three-to-five year period. The Company used a Monte-Carlo simulation model to estimate the grant date fair value utilizing an expected volatility of 63.4% and a risk free rate of 2.92%.

The following table provides detail of grants, vesting, and forfeitures of RSUs during 2023:

| | Restricted Stock Units | Weighted Average Grant Date Fair Value |
|------------------------------|------------------------------|---|
| Balance at December 31, 2022 | 257,075 | \$ 22.19 |
| Granted | 523,783 | 8.72 |
| Vested | (117,941) | 18.97 |
| Forfeited | (88,670) | 16.93 |
| Balance at December 31, 2023 | 574,247 | \$ 11.38 |

Restricted stock awards granted during 2023 are considered issued and outstanding common stock and are excluded from the table above. As of December 31, 2023, there were 881,674 shares of restricted stock outstanding of which 44,928 were granted to nonemployee directors, 461,616 shares of restricted stock outstanding granted to the Company's chief executive officer and 375,130 shares of restricted stock outstanding granted to other employees.

The total intrinsic value of restricted stock and RSUs that vested in 2023 and 2022 was \$1.3 million and \$7.4 million, respectively. As of December 31, 2023, 1,377,796 of the total shares of restricted stock and RSUs outstanding will vest upon the fulfillment of service conditions.

As of December 31, 2023, total unrecognized compensation cost related to restricted stock awards issued to nonemployee directors of \$0.1 million, and RSUs of \$4.4 million is expected to be recognized over a weighted average period of 0.42 years and 1.90 years respectively.

As of December 31, 2023, total unrecognized compensation cost related to restricted stock awards issued to the Company's chief executive officer and certain other employees of \$4.1 million is expected to be recognized over a weighted average period of 1.08 years.

(16) CARES Act Payroll Tax Deferral

The Company elected to defer approximately \$0.9 million of its employer payroll tax obligation for the period from March 27, 2020 to December 31, 2020 pursuant to the provisions of the CARES Act. The Company was required to remit 50 percent of the deferred tax balance on or before December 31, 2021 and is required to remit the remaining 50 percent on or before December 31, 2022. As of December 31, 2022, the Company had remitted its repayment obligation.

(17) Net Loss Per Share

The computation of basic and diluted net loss per share consists of the following:

| | Year ended December 31, | | |
|--|---|-------------|-------------|
| | 2023 | 2022 | 2021 |
| | (In thousands, except share and per share data) | | |
| Numerator: | | | |
| Net loss | \$ (45,811) | \$ (82,738) | \$ (37,094) |
| Denominator: | | | |
| Weighted average shares outstanding, basic and diluted | 69,439,034 | 39,363,114 | 30,433,154 |
| Net loss per share, basic and diluted | \$ (0.66) | \$ (2.10) | \$ (1.22) |

Potentially dilutive common shares that were excluded from the computation of diluted net loss per share because they were anti-dilutive consist of the following:

| | Year ended December 31, | | |
|--------------------------------|-------------------------|-----------|-----------|
| | 2023 | 2022 | 2021 |
| Common stock options | 5,234,194 | 3,904,080 | 3,567,207 |
| Restricted common stock units | 574,247 | 257,075 | 350,195 |
| Restricted common stock awards | 881,674 | 23,886 | 14,934 |
| Convertible note, if converted | 3,951,833 | 3,601,533 | — |
| Total | 10,641,948 | 7,786,574 | 3,932,336 |

In the table above, the potential dilutive shares from common stock options, restricted common stock units, restricted common stock awards, and the convertible note were excluded from the calculation of diluted net loss per share because their effect would have been anti-dilutive for the periods presented. The Company excludes the shares issued in connection with restricted stock awards from the calculation of basic weighted average common shares outstanding until the restrictions lapse.

For each of the years ended December 31, 2023, 2022 and 2021, there was no dilutive impact of the common stock options, RSUs, and restricted stock awards.

(18) Income Taxes

The Company incurred net operating losses and recorded a full valuation allowance against net deferred assets for all periods presented. Accordingly, the Company has not recorded a provision for federal or state income taxes.

The reconciliation between the U.S. statutory income tax rate and the Company's effective rate consists of the following:

| | Year Ended December 31, | | |
|--|-------------------------|-------|-------|
| | 2023 | 2022 | 2021 |
| U.S. federal income tax statutory rate | 21 % | 21 % | 21 % |
| Permanent differences | — | 1 % | 10 % |
| State tax, net of federal benefit | 7 % | 5 % | 5 % |
| Changes in valuation allowance for deferred tax assets | (17)% | (27)% | (35)% |
| Stock-based compensation | (7)% | —% | —% |
| Expiring net operating losses | —% | —% | (1)% |
| Other | 2 % | —% | —% |
| State rate change | (6)% | —% | —% |
| Effective tax rate | — | — | — |

The tax effects of temporary differences between financial statement and tax accounting that gave rise to significant portions of the Company's deferred tax assets and deferred tax liabilities at December 31, 2023 and 2022 are presented below:

| | December 31, | |
|---|----------------|-----------|
| | 2023 | 2022 |
| | (In thousands) | |
| Deferred tax assets: | | |
| Net operating loss carryforwards | \$ 82,563 | \$ 81,943 |
| Stock-based compensation | 3,076 | 6,677 |
| Operating lease liabilities | 5,997 | 4,065 |
| Capitalized research and development | 6,320 | 3,916 |
| Tax credit carryforwards | 4,261 | 448 |
| Reserves and accruals | 6,180 | 3,160 |
| Interest expense limitation | 929 | 1,257 |
| Total gross deferred tax assets | 109,326 | 101,466 |
| Deferred tax liabilities: | | |
| Depreciation | (1,125) | (1,879) |
| Operating lease right-of-use assets | (4,340) | (3,081) |
| Total deferred tax liabilities | (5,465) | (4,960) |
| Total deferred tax assets and liabilities | 103,861 | 96,506 |
| Valuation allowance | (103,861) | (96,506) |
| Net deferred tax asset | \$ — | \$ — |

The net change in the valuation allowance for the year ended December 31, 2023, was an increase of \$7.4 million. The Company has recorded a full valuation allowance against its deferred tax assets due to the uncertainty associated with the utilization of the net operating loss carryforwards and other future deductible items. In assessing the realizability of deferred tax assets, the Company considers all available evidence, historical and prospective, with greater weight given to historical evidence, in determining whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of the Company's deferred tax assets generally is dependent upon generation of future taxable income.

At December 31, 2023, the Company had \$358.9 million of net operating losses available to offset future federal income, if any, of which \$194.6 million expire on various dates through December 31, 2037. Net operating losses of \$164.3 million generated from 2018 through 2023 have an unlimited carryforward.

At December 31, 2023, the Company had \$198.6 million of apportioned net operating losses available to offset future state taxable income, if any, and which begin to expire at various dates between 2024 and 2043.

For each of the years ended December 31, 2023, 2022 and 2021, the Company did not have any material unrecognized tax benefits and thus no interest and penalties related to unrecognized tax benefits were recorded. In addition, the Company does not expect that the amount of unrecognized tax benefits will change significantly within the next twelve months.

The Company files a federal income tax return in the United States and income tax returns in various state and foreign jurisdictions. All tax years are open for examination by the taxing authorities for both federal and state purposes.

The Tax Cuts and Jobs Act (“TCJA”) requires taxpayers to capitalize and amortize research and development (“R&D”) expenditures under section 174 for tax years beginning after December 31, 2021. This rule became effective for the Company during 2022. Capitalized R&D costs were \$31.6 million as of December 31, 2023. The Company will amortize these costs for tax purposes over 5 years for R&D performed in the U.S. and over 15 years for R&D performed outside the U.S. In 2023, all R&D was performed in the U.S.

(19) Segment Information

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 in making decisions on how to allocate resources and assess performance. The Company’s chief operating decision maker is the Chief Executive Officer. The Company’s chief operating decision maker reviews consolidated operating results to make decisions about allocating resources and assessing performance for the entire Company. The Company reports two segments: Energy Industrial and Thermal Barrier. We evaluate segment performance based on the segment profit (loss) before corporate expenses.

Summarized below are the Revenue and Segment Operating Profit for each reporting segment:

| | Year Ended Revenue December 31 | | | Year Ended Segment Operating Profit (Loss) December 31 | | |
|--------------------|--------------------------------------|-------------------|-------------------|--|--------------------|--------------------|
| | 2023 | 2022 | 2021 | 2023 | 2022 | 2021 |
| | (In thousands) | | | | | |
| Energy industrial | \$ 128,639 | \$ 124,807 | \$ 114,958 | \$ 34,162 | \$ 18,844 | \$ 14,486 |
| Thermal barrier | 110,079 | 55,557 | 6,664 | 22,759 | (13,868) | (4,549) |
| Total | <u>\$ 238,718</u> | <u>\$ 180,364</u> | <u>\$ 121,622</u> | <u>\$ 56,921</u> | <u>\$ 4,976</u> | <u>\$ 9,937</u> |
| Corporate expenses | | | | 106,124 | 84,221 | 50,536 |
| Operating loss | | | | (49,203) | (79,245) | (40,599) |
| Other expense, net | | | | 3,392 | (3,493) | 3,505 |
| Net loss | | | | <u>\$ (45,811)</u> | <u>\$ (82,738)</u> | <u>\$ (37,094)</u> |

| | 2023 | Year Ended Depreciation Expense December 31, 2022 | 2021 |
|-----------------------------------|------------------|--|-----------------|
| | (In thousands) | | |
| Energy industrial | \$ 10,720 | \$ 8,476 | \$ 9,440 |
| Thermal barrier | 4,598 | 746 | — |
| Consolidated depreciation expense | <u>\$ 15,318</u> | <u>\$ 9,222</u> | <u>\$ 9,440</u> |

| | 2023 | Total Assets December 31, 2022 | 2022 |
|-------------------------------------|-------------------|--------------------------------------|------|
| | (In thousands) | | |
| Energy industrial | \$ 93,168 | \$ 94,415 | |
| Thermal barrier | 118,565 | 39,320 | |
| Total assets of reportable segments | 211,733 | 133,735 | |
| Construction in progress | 314,678 | 209,050 | |
| All other corporate assets | 176,637 | 300,631 | |
| | <u>\$ 703,048</u> | <u>\$ 643,416</u> | |

Information about the Company's total revenues, based on shipment destination or services location, is presented in the following table:

| | Year Ended December 31, | | |
|---------------|----------------------------|-------------------|-------------------|
| | 2023 | 2022 | 2021 |
| | (\$ in thousands) | | |
| Revenue: | | | |
| U.S. | \$ 151,037 | \$ 113,968 | \$ 66,837 |
| International | 87,681 | 66,396 | 54,785 |
| Total | <u>\$ 238,718</u> | <u>\$ 180,364</u> | <u>\$ 121,622</u> |

(20) Subsequent Events

In January 2024, the Company was notified by a customer of an engineering change to one of the parts the Company manufactures for that customer to enable incremental productivity and support a set of broader system level changes that could drive higher demand for its parts. The Company has submitted a preliminary claim to the customer for reimbursement for estimated inventory and equipment losses incurred by the Company and its vendors due to potential obsolescence. The customer's ordinary course process is to audit the claim to determine the proposed reimbursable amount. The Company expects the matter to be concluded by the second quarter of 2024, and currently estimates the potential impact to be in the range of zero to approximately \$10.0 million.

In January 2024, we entered into a sale and leaseback arrangement, pursuant to which we sold certain equipment to an equipment leasing company for a one-time cash payment of \$5.0 million and leased back such equipment from the leasing company. The associated monthly lease rents will be paid over the term of three years.

On March 5, 2024, the Compensation and Leadership Development Committee of the Company's Board of Directors (the "Committee") approved the cancellation of the outstanding, unearned portion of the performance-based restricted shares granted to certain employees pursuant to the Company's 2014 Employee, Director and Consultant Equity Incentive Plan on June 29, 2021 (to the CEO) and June 2, 2022 (to certain other employees). The Committee determined that, based on current market conditions, the likelihood of achievement of any of the remaining performance hurdles applicable to the unearned restricted shares is remote, and that the unearned restricted shares therefore had ceased to have incentive value for the grantees. On March 6, 2024, the Company entered into cancellation agreements pursuant to which the applicable employees agreed to such cancellation. The cancellation of the unearned restricted shares resulted in an acceleration of the unamortized stock-based compensation charges of approximately \$2.2 million.

Schedule II
VALUATION AND QUALIFYING ACCOUNTS
(in thousands)

| Description | Balance at Beginning of Year | Charges to Costs and Expenses (a) | Recoveries of Costs and Expenses (b) | Deductions to Allowances for Uncollectible Accounts (c) | Charges to (Deductions from) Other Accounts (d) | Balance at End of Year |
|--|---------------------------------------|---|--|---|---|---------------------------------|
| Year Ended December 31, 2023: | | | | | | |
| Allowances for uncollectible accounts and sales returns and allowances | \$ 255 | (93) | — | — | 68 | \$ 230 |
| Year Ended December 31, 2022: | | | | | | |
| Allowances for uncollectible accounts and sales returns and allowances | \$ 150 | 115 | — | — | (10) | \$ 255 |
| Year Ended December 31, 2021: | | | | | | |
| Allowances for uncollectible accounts and sales returns and allowances | \$ 442 | (84) | (208) | — | — | \$ 150 |

- (a) Represents allowances for uncollectible accounts established through general and administrative expenses.
- (b) Represents recoveries of allowances for uncollectible accounts established through general and administrative expenses.
- (c) Represents actual write-offs of uncollectible accounts.
- (d) Represents net change in allowances for sales returns, recorded as contra-revenue.

Item 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

Not applicable.

Item 9A. CONTROLS AND PROCEDURES

(a) *Evaluation of Disclosure Controls and Procedures.* We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in the reports that we file or submit under the Securities Exchange Act of 1934, as amended, or the Exchange Act, is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and is accumulated and communicated to our management, including our principal executive officer and principal financial officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

As of December 31, 2023, our management, with the participation of our principal executive officer and principal financial officer, evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act). Our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives, and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on such evaluation, our principal executive officer and principal financial officer have concluded, that, as of December 31, 2023, our disclosure controls and procedures were effective to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and is accumulated and communicated to our management, including our principal executive officer and principal financial officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure.

(b) *Management's Report on Internal Control over Financial Reporting.* The Company's management is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act, as a process designed by, or under the supervision of, the Company's principal executive and principal financial officers and effected by the Company's Board of Directors, management and other personnel 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. The Company's internal control over financial reporting includes those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the Company;
- 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
- 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. 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.

The Company's management assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2023. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission, or COSO, in Internal Control-Integrated Framework (2013).

Based on our assessment, management believes that, as of December 31, 2023, the Company's internal control over financial reporting is effective based on those criteria.

Our independent registered public accounting firm has issued an audit report on our assessment of our internal control over financial reporting. This report appears further below in this Item 9A.

(c) *Changes in Internal Controls*. There were no changes in our internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15(d)-15(f) promulgated under the Exchange Act, identified in connection with the evaluation of such internal control that occurred during the fourth quarter of the last fiscal year that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. OTHER INFORMATION

Rule 10b5-1 Trading Plans

During the fiscal quarter ended December 31, 2023, none of our directors or executive officers adopted, modified or terminated any contract, instruction or written plan for the purchase or sale of our securities that was intended to satisfy the affirmative defense conditions of Rule 10b5-1(c) or any “non-Rule 10b5-1 trading arrangement” as defined in Item 408(c) of Regulation S-K.

Item 9C. DISCLOSURE REGARDING FOREIGN JURISDICTIONS THAT PREVENT INSPECTIONS

Not applicable.

PART III

Item 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The response to this item is incorporated by reference from the discussion responsive thereto under the captions “Management and Corporate Governance,” “Delinquent Section 16(a) Reports,” and “Code of Business Conduct and Ethics” in the Company’s Proxy Statement for the 2024 Annual Meeting of Stockholders.

Item 11. EXECUTIVE COMPENSATION

The response to this item is incorporated by reference from the discussion responsive thereto under the caption “Executive and Director Compensation,” “Compensation Discussion and Analysis,” “Management and Corporate Governance – Compensation Committee Interlocks and Insider Participation,” “Compensation Committee Report” and “Risks Related to Compensation Practices and Policies” in the Company’s Proxy Statement for the 2024 Annual Meeting of Stockholders.

Item 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The response to this item is incorporated by reference from the discussion responsive thereto under the captions “Security Ownership of Certain Beneficial Owners and Management” and “Equity Compensation Plan Information” in the Company’s Proxy Statement for the 2024 Annual Meeting of Stockholders.

Item 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The response to this item is incorporated by reference from the discussion responsive thereto under the captions “Certain Relationships and Related Person Transactions” and “Management and Corporate Governance” in the Company’s Proxy Statement for the 2024 Annual Meeting of Stockholders.

Item 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The response to this item is incorporated by reference from the discussion responsive thereto under the caption “Independent Registered Public Accounting Firm” in the Company’s Proxy Statement for the 2024 Annual Meeting of Stockholders.

PART IV

Item 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

Item 15(a). The following documents are filed as part of this Annual Report on Form 10-K:

Item 15(a)(1). The following consolidated financial statements of the Company are included in Part II, Item 8 of this Annual Report on Form 10-K:

Report of Independent Registered Public Accounting Firm
Consolidated Balance Sheets as of December 31, 2023 and 2022
Consolidated Statements of Operations for the Years Ended December 31, 2023, 2022, and 2021
Consolidated Statements of Stockholders' Equity for the Years Ended December 31, 2023, 2022 and 2021
Consolidated Statements of Cash Flows for the Years Ended December 31, 2023, 2022 and 2021
Notes to Consolidated Financial Statements

Item 15(a)(2). The following financial statements schedule is included in Part II, Item 8:

Schedule II – Valuation and Qualifying Accounts

All other financial statement schedules have not been included because they are not applicable or the information is included in the financial statements or notes thereto.

Item 15(a)(3). Exhibits:

The following is a list of exhibits filed as part of this Annual Report on Form 10-K.

| Exhibit Number | Exhibit Description | Filed with this Report | Incorporated by Reference herein from Form or Schedule | Filing Date | SEC File/Reg. Number |
|----------------|--|------------------------|--|-------------|----------------------|
| 3.1 | Restated Certificate of Incorporation of the Registrant, as filed with the Secretary of State of the State of Delaware on June 18, 2014. | | Form 8-K (Exhibit 3.2) | 6/19/14 | 001-36481 |
| 3.1.2 | Certificate of Amendment to Restated Certificate of Incorporation of Aspen Aerogels, Inc., dated June 1, 2023. | | Form 8-K (Exhibit 3.1) | 6/1/23 | 001-36481 |
| 3.2 | Amended and Restated Bylaws of Aspen Aerogels, Inc. | X | | | |
| 4.1 | Form of common stock certificate. | | Amendment No. 1 to Form S-1 (Exhibit 4.1) | 5/14/14 | 333-195523 |
| 4.2 | Description of Securities. | | Form 10-K (Exhibit 4.3) | 3/6/20 | 001-36481 |
| 4.3 | Form of Note (including Indenture incorporated by reference therein). | | Form 8-K (Exhibit 4.1) | 2/17/22 | 001-36481 |
| 4.4 | Amendment No. 1 to Convertible Senior PIK Toggle Notes due 2027, dated November 28, 2022. | | Form 8-K (Exhibit 4.3) | 11/29/22 | 001-36481 |
| 10.1 | 2001 equity incentive plan, as amended. + | | Form S-1 (Exhibit 10.1.1) | 4/28/14 | 333-195523 |
| 10.2 | Form of incentive stock option agreement granted under 2001 equity incentive plan, as amended. + | | Form S-1 (Exhibit 10.1.2) | 4/28/14 | 333-195523 |

| Exhibit Number | Exhibit Description | Filed with this Report | Incorporated by Reference herein from Form or Schedule | Filing Date | SEC File/Reg. Number |
|----------------|---|------------------------|--|-------------|----------------------|
| 10.3 | Form of non-qualified stock option agreement granted under 2001 equity incentive plan, as amended.+ | | Form S-1 (Exhibit 10.1.5) | 4/28/14 | 333-195523 |
| 10.4 | 2014 employee, director and consultant equity incentive plan. + | | Form S-8 (Exhibit 99.10) | 8/13/14 | 333-198124 |
| 10.5 | Form of stock option agreement granted under 2014 employee, director and consultant equity incentive plan.+ | | Amendment No. 1 to Form S-1 (Exhibit 10.2.2) | 5/14/14 | 333-195523 |
| 10.6 | Form of restricted stock unit agreement for executive officers under 2014 employee, director and consultant equity incentive plan. + | | Form 10-Q (Exhibit 10.3) | 11/7/14 | 001-36481 |
| 10.7 | Form of restricted stock agreement for directors under 2014 employee, director and consultant equity incentive plan. + | | Amendment No. 1 to Form S-1 (Exhibit 10.2.3) | 5/14/14 | 333-195523 |
| 10.7.1 | Aspen Aerogels 2023 Equity Incentive Plan. | | Form 8-K (Exhibit 10.1) | 6/1/23 | 001-36481 |
| 10.7.2 | Form of Stock Option Agreement under the Aspen Aerogels 2023 Equity Incentive Plan. | | Form 8-K (Exhibit 10.2) | 6/1/23 | 001-36481 |
| 10.7.3 | Form of Restricted Stock Unit Agreement for Executive Officers under the Aspen Aerogels 2023 Equity Incentive Plan. | | Form 8-K (Exhibit 10.3) | 6/1/23 | 001-36481 |
| 10.7.4 | Form of Restricted Stock Agreement for Directors under the Aspen Aerogels 2023 Equity Incentive Plan. | | Form 8-K (Exhibit 10.4) | 6/1/23 | 001-36481 |
| 10.7.5 | Form of Director Stock Option Agreement under the Aspen Aerogels 2023 Equity Incentive Plan. | | Form 8-K (Exhibit 10.5) | 6/1/23 | 001-36481 |
| 10.8 | Multi-tenant industrial net lease, dated August 20, 2001, by and between the Registrant and Cabot II — MA1M03, LLC (as successor landlord to TMT290 Industrial Park, Inc.), as amended. | | Form S-1 (Exhibit 10.3) | 4/28/14 | 333-195523 |
| 10.8.1 | First Amendment to Lease, dated December 22, 2021, by and between the Registrant and G&I IX Forbes Whitney, LLC. | | Form 10-K (Exhibit 10.14.1) | 3/1/22 | 001-36481 |
| 10.9 | Form of Performance-Based Restricted Stock Agreement for certain employees + | | Form 10-Q (Exhibit 10.2) | 8/4/22 | 001-36481 |
| 10.10 | Loan Agreement, dated November 28, 2022, by and between the Registrant, Aspen Aerogels Georgia LLC, Aspen Aerogels Rhode Island, LLC and General Motors Holdings LLC. | | Form 8-K (Exhibit 10.1) | 11/29/22 | 001-36481 |
| 10.10.1 | First Amendment, dated September 28, 2023, to the Loan Agreement, dated November 28, 2022, by and among the Company, Aspen Aerogels Georgia, LLC, Aspen Aerogels Rhode Island, LLC and General Motors Holdings LLC. | | Form 10-Q (Exhibit 10.2) | 11/2/23 | 001-36481 |
| 10.11 | Executive Agreement, dated as of January 4, 2022, by and between the Registrant and Donald R. Young. + | | Form 10-K (Exhibit 10.17.4) | 3/1/22 | 001-36481 |
| 10.12 | Executive Employment Agreement, dated January 1, 2023, by and between the Registrant and Ricardo C. Rodriguez.+ | | Form 10-K (Exhibit 10.18(3)) | 3/16/23 | 001-36481 |

| Exhibit Number | Exhibit Description | Filed with this Report | Incorporated by Reference herein from Form or Schedule | Filing Date | SEC File/Reg. Number |
|----------------|--|------------------------|--|-------------|----------------------|
| 10.12(1) | Executive Employment Agreement, dated January 1, 2023, by and between the Registrant and Gregg Landes.+ | | Form 10-K (Exhibit 10.18(5)) | 3/16/23 | 001-36481 |
| 10.12(2) | Executive Employment Agreement, dated March 25, 2022, by and between the Registrant and Virginia H. Johnson.+ | | Form 10-K (Exhibit 10.18(6)) | 3/16/23 | 001-36481 |
| 10.12(3) | Executive Employment Agreement, dated January 1, 2023, by and between the Registrant and Keith Schilling.+ | | Form 10-K (Exhibit 10.18(7)) | 3/16/23 | 001-36481 |
| 10.12(4) | Executive Employment Agreement, dated January 1, 2023, by and between the Registrant and Corby Whitaker.+ | | Form 10-K (Exhibit 10.18(8)) | 3/16/23 | 001-36481 |
| 10.12(5) | Executive Employment Agreement, dated September 14, 2023, by and between the Registrant and Santhosh Daniel.+ | | Form 10-Q (Exhibit 10.1) | 11/2/23 | 001-36481 |
| 10.12(6) | Executive Employment Agreement, dated September 5, 2023, by and between the Registrant and Stephanie Pittman.+ | | Form 10-Q (Exhibit 10.4) | 11/2/23 | 001-36481 |
| 10.13 | Aspen Aerogels, Inc. Bonus Plan (Amended and Restated Effective as of January 1, 2024).+ | | Form 10-Q (Exhibit 10.3) | 11/2/23 | 001-36481 |
| 10.14 | Form of participation letter of executive officers under bonus plan. + | | Form 10-K (Exhibit 10.23) | 3/2/17 | 001-36481 |
| 10.15 | Non-Employee Director Compensation Policy. + | | Form 10-Q (Exhibit 10.13) | 5/10/22 | 001-36481 |
| 10.16 | Cross license agreement dated as of April 1, 2006 by and between Cabot Corporation and the Registrant, as amended.* | | Form S-1 (Exhibit 10.17) | 4/28/14 | 333-195523 |
| 10.17 | Form of indemnification agreement with directors and certain officers. + | | Amendment No. 1 to Form S-1 (Exhibit 10.18) | 5/14/14 | 333-195523 |
| 10.18 | Inducement Agreement, dated as of February 17, 2022, by and among Aspen Aerogels Georgia, LLC, the Development Authority of Bulloch County, the City of Statesboro, and Bulloch County, Georgia. | | Form 10-Q (Exhibit 10.1) | 5/10/22 | 001-36481 |
| 10.19 | PILOT Agreement, dated as of February 17, 2022, by and among Aspen Aerogels Georgia, LLC and the Development Authority of Bulloch County. | | Form 10-Q (Exhibit 10.3) | 5/10/22 | 001-36481 |
| 10.20 | Performance and Accountability Agreement, dated as of February 17, 2022, by and among Aspen Aerogels Georgia, LLC, the Development Authority of Bulloch County, and the Georgia Department of Community Affairs. | | Form 10-Q (Exhibit 10.4) | 5/10/22 | 001-36481 |
| 10.21 | Securities Purchase Agreement, dated February 15, 2022, by and between the Registrant and Wood River Capital, LLC. | | Form 8-K (Exhibit 10.2) | 2/17/22 | 001-36481 |
| 10.22 | Memorandum of Understanding, dated as of February 17, 2022, by and between Aspen Aerogels Georgia, LLC, the Development Authority of Bulloch County and the Georgia Department of Economic Development. | | Form 10-Q (Exhibit 10.2) | 5/10/22 | 001-36481 |
| 10.23 | Securities Purchase Agreement, dated as of December 19, 2023, by and among Aspen Aerogels, Inc. and the investors identified on the signature pages thereto. | | Form 8-K (Exhibit 10.1) | 12/20/23 | 001-36481 |

| Exhibit Number | Exhibit Description | Filed with this Report | Incorporated by Reference herein from Form or Schedule | Filing Date | SEC File/Reg. Number |
|----------------|---|------------------------|--|-------------|----------------------|
| 10.24 | Supply Agreement, dated February 3, 2021, by and between the registrant and Silbond Corporation.* | | Form 10-Q (Exhibit 10.1) | 5/4/21 | 001-36481 |
| 10.25 | Securities Purchase Agreement, dated June 29, 2021, by and between the Registrant and Spring Creek Capital, LLC. | | Form 8-K (Exhibit 10.1) | 6/30/21 | 001-36481 |
| 10.26 | Performance-Based Restricted Stock Agreement, dated as of June 29, 2021, by and between the Registrant and Donald R. Young. + | | Form 10-Q (Exhibit 10.3) | 8/4/21 | 001-36481 |
| 10.27 | Note Purchase Agreement, dated February 15, 2022, by and between the Registrant and Wood River Capital, LLC. | | Form 8-K (Exhibit 10.1) | 2/17/22 | 001-36481 |
| 10.27.1 | Amendment to Note Purchase Agreement, dated November 28, 2022, by and between the Registrant and Wood River Capital, LLC. | | Form 8-K (Exhibit 10.12) | 11/29/22 | 001-36481 |
| 14.1 | Code of Business Conduct and Ethics. | X | | | |
| 21.1 | Subsidiaries of the Registrant. | X | | | |
| 23.1 | Consent of KPMG LLP. | X | | | |
| 31.1 | Certification of principal executive officer under Section 302(a) of the Sarbanes-Oxley Act of 2002. | X | | | |
| 31.2 | Certification of principal financial officer under Section 302(a) of the Sarbanes-Oxley Act of 2002. | X | | | |
| 32 | Certifications of the principal executive officer and the principal financial officer under Section 906 of the Sarbanes-Oxley Act of 2002. | X | | | |
| 97 | Compensation Recoupment Policy (Amended and Restated Effective June 1, 2023). | X | | | |
| 101.INS | XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document. | X | | | |
| 101.SCH | Inline XBRL Taxonomy Extension Schema Document. | X | | | |
| 101.CAL | Inline XBRL Taxonomy Extension Calculation Linkbase Document. | X | | | |
| 101.DEF | Inline XBRL Taxonomy Extension Definition Linkbase Document. | X | | | |
| 101.LAB | Inline XBRL Taxonomy Extension Label Linkbase Document. | X | | | |
| 101.PRE | Inline XBRL Taxonomy Extension Presentation Linkbase Document. | X | | | |
| 104 | Cover Page Interactive Data File (embedded within the Inline XBRL document). | X | | | |

+ Management contract or compensatory plan or arrangement.

* Confidential treatment has been granted with respect to certain portions of this Exhibit, which portions have been omitted and filed separately with the Securities and Exchange Commission as part of an application for confidential treatment pursuant to the Securities Act of 1933, as amended.

Item 16. FORM 10-K SUMMARY

None.

SIGNATURES

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

ASPEN AEROGELS, INC.

Date: March 7, 2024

By: /s/ Donald R. Young
Donald R. Young
President and Chief Executive Officer
(principal executive officer)

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

| <u>Signature</u> | <u>Title</u> | <u>Date</u> |
|---|---|---------------|
| <u>/s/ Donald R. Young</u> Donald R. Young | President, Chief Executive Officer and Director (principal executive officer) | March 7, 2024 |
| <u>/s/ Ricardo C. Rodriguez</u> Ricardo C. Rodriguez | Chief Financial Officer and Treasurer (principal financial officer) | March 7, 2024 |
| <u>/s/ Santhosh P. Daniel</u> Santhosh P. Daniel | Chief Accounting Officer (principal accounting officer) | March 7, 2024 |
| <u>/s/ William P. Noglows</u> William P. Noglows | Chairperson of the Board | March 7, 2024 |
| <u>/s/ Rebecca B. Blalock</u> Rebecca B. Blalock | Director | March 7, 2024 |
| <u>/s/ James E. Sweetnam</u> James E. Sweetnam | Director | March 7, 2024 |
| <u>/s/ Kathleen M. Kool</u> Kathleen M. Kool | Director | March 7, 2024 |
| <u>/s/ Steven R. Mitchell</u> Steven R. Mitchell | Director | March 7, 2024 |
| <u>/s/ Mark L. Noetzel</u> Mark L. Noetzel | Director | March 7, 2024 |

Consent of Independent Registered Public Accounting Firm

The Board of Directors
Aspen Aerogels, Inc.:

We consent to the incorporation by reference in the registration statements (Nos. 333-221403, 333-259449, 333-254250, 333-263622, and 333-264672) on Form S-3 and registration statements (Nos. 333-272346, 333-270615, 333-263124, 333-254247, 333-236955, 333-230165, 333-223380, 333-216434, 333-209995, and 333-198124) on Form S-8 of our report dated March 7, 2024, with respect to the consolidated financial statements of Aspen Aerogels, Inc. and the effectiveness of internal control over financial reporting.

/s/ KPMG LLP

Boston, Massachusetts
March 7, 2024

CERTIFICATIONS UNDER SECTION 302

I, Donald R. Young, certify that:

1. I have reviewed this annual report on Form 10-K of Aspen Aerogels, 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: March 7, 2024

/s/ Donald R. Young

Donald R. Young

President and Chief Executive Officer

(principal executive officer)

CERTIFICATIONS UNDER SECTION 302

I, Ricardo C. Rodriguez, certify that:

1. I have reviewed this annual report on Form 10-K of Aspen Aerogels, 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: March 7, 2024

/s/ Ricardo C. Rodriguez

Ricardo C. Rodriguez
Chief Financial Officer and Treasurer
(principal financial officer)

CERTIFICATIONS UNDER SECTION 906

Pursuant to section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of section 1350, chapter 63 of title 18, United States Code), each of the undersigned officers of Aspen Aerogels, Inc., a Delaware corporation (the “Company”), does hereby certify, to such officer’s knowledge, that:

The Annual Report for the year ended December 31, 2023 (the “Form 10-K”) of the Company fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and the information contained in the Form 10-K fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: March 7, 2024

/s/ Donald R. Young

Donald R. Young
President and Chief Executive Officer
(principal executive officer)

Dated: March 7, 2024

/s/ Ricardo C. Rodriguez

Ricardo C. Rodriguez
Chief Financial Officer and Treasurer
(principal financial officer)

Corporate Information

Directors

William P. Noglows, Chairperson

Former Chairperson of the Board of CMC Materials, Inc., formerly known as Cabot Microelectronics Corporation

Donald R. Young

President, Chief Executive Officer of Aspen Aerogels, Inc.

Rebecca B. Blalock

Partner at Advisory Capital LLC

Kathleen M. Kool

Former Chief Executive Officer of Tide Cleaners, a wholly owned subsidiary of Procter & Gamble

Steven R. Mitchell

Chief Executive Officer of Argonaut Private Capital L.P.

Mark L. Noetzel

Former Managing Director of Akoya Capital Partners, LLC

James E. Sweetnam

Former President and CEO, and a member of the board, of Dana Corporation

Executive Officers

Donald R. Young

President and Chief Executive Officer

Virginia H. Johnson

Chief Legal Officer, General Counsel, Corporate Secretary and Chief Compliance Officer

Gregg R. Landes

Senior Vice President, Operations and Strategic Development

Stephanie Pittman

Chief Human Resources Officer

Ricardo C. Rodriguez

Chief Financial Officer and Treasurer

Keith L. Schilling

Senior Vice President, Technology

Corby C. Whitaker

Senior Vice President, Sales and Marketing

Stockholders and Stock Listing

Our common stock is traded on the New York Stock Exchange under the symbol ASPN. On April 3, 2024, the closing price of our common stock was \$17.06 per share and our common stock was held by 38 stockholders of record.

Investor Information

You may obtain a copy of any of the exhibits to our Annual Report on Form 10-K free of charge. These documents are available on our website at www.aerogel.com or by contacting Investor Relations team at 508-691-1111.

Requests for information about Aspen Aerogels, Inc. should be directed to our Investor Relations team.

Annual Meeting

Our 2024 annual meeting of stockholders will be held at 9:30 a.m. Eastern Time on Thursday, May 30, 2024, via live audio webcast on the Internet at the following URL:
www.virtualshareholdermeeting.com/ASPN2024

Internet Website

www.aerogel.com

Legal Counsel

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. Boston, Massachusetts

Thompson Hine LLP, Cleveland, Ohio

Independent Registered Public Accounting Firm

KPMG LLP
Boston, Massachusetts

Transfer Agent and Registrar

Computershare Trust Company, N.A.
Meidinger Tower, 462 S. 4th Street
Louisville, KY 40202



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