Risk Factors Comparison 2024-03-07 to 2023-03-16 Form: 10-K

Legend: **New Text** ~~Removed Text~~ Unchanged Text Moved Text Section

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** ~~electric vehicle~~ 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** ~~electric vehicle~~ 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. • ~~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. •~~ 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 ~~. • If we fail to successfully construct and / or operate in a timely manner, or at all, our planned second manufacturing facility in Bulloch County, Georgia, we may fail to increase our production capacity to the level necessary to support our anticipated growth and our business and / or results of operations may be materially adversely affected~~. • 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. • ~~If we do not respond appropriately, the evolution of the automotive industry towards mobility on demand services could adversely affect our business. •~~ 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 ~~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. • 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 ~~. • 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 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 ~~. • 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~~. • 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. • ~~Our contracts with the U. S. government and other third parties could negatively affect our intellectual property rights. • 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 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. •~~ 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 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 and $ 21. 8~~ million for the years ended December 31, **2023,** 2022 ~~,~~ **and** 2021 ~~and 2020~~, respectively. As of December 31, ~~2022~~ **2023**, our accumulated deficit was $ ~~627~~ **673**. ~~8~~ **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. 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 ~~2023 and~~ 2024 related to maintaining our aerogel manufacturing operations in our East Providence, Rhode Island facility ~~,~~ **and** the ~~ongoing~~ construction of our second aerogel plant in Bulloch County, Georgia ~~and the construction of an automated fabrication operation in Mexico~~, 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 ~~2023~~ **2024** and beyond. Any such future significant expansion of our aerogel capacity, ~~fabrication 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** ~~electric vehicle~~ 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** ~~electric vehicle~~ applications. In 2020 and 2021, we entered into contracts with **GM** ~~a U. S. automotive OEM~~ to supply our thermal barrier products for use in the battery system of its ~~electric vehicles~~ **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** ~~the U. S. automotive OEM, an~~ **and Toyota** ~~Asian automotive OEM~~, 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** ~~electric vehicle~~ market. As a result of our existing contract with **GM and** ~~the~~ **other** ~~U. S. automotive OEM~~ **OEMs**, current sales to others in the **EV** ~~electric vehicle~~ 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** ~~U. S. automotive OEM~~ , ~~the~~ **they are** ~~U. S. automotive OEM is~~ 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** ~~the U. S. automotive OEM~~ , 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** ~~electric vehicle~~ 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** ~~electric vehicle~~ OEMs and are part of a Chinese **EV** ~~electric vehicle~~ industry that we believe is in many ways more mature than the **EV** ~~electric vehicle~~ 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** ~~Electric vehicles~~ 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. ~~Consequently~~ **To meet expected growth in demand for our aerogel products in the EV market** , we ~~are~~ **have been in the process of expanding our aerogel blanket capacity by** constructing a second manufacturing plant in Bulloch County, Georgia. ~~We had initially expected~~ **However, in order** to ~~build~~ **manage the development of** the second plant **so that its increased capacity comes online** in ~~two phases and had previously estimated~~ a ~~cost~~ **manner that aligns with our current expectations** of ~~approximately $ 575. 0 million~~ **demand from our EV customers, we are extending the timeframe** for **construction** ~~the first phase~~ and ~~approximately $ 125~~ **commissioning of the second plant until such time as its capacity is supported by increased demand** . ~~0 million~~ **In the meantime, and until we ramp up construction, we expect to be able to substantially reduce our planned capital expenditures** for **2024** ~~the second phase~~ . **At** ~~However, we have refined our approach to revenue capacity planning and corresponding project milestones and are no longer taking a phased approach to~~ the **same time** ~~project. Instead~~ , we ~~are focused~~ **believe that productivity improvements in our existing Rhode Island facility combined with our supplement supply of our energy industrial products from** ~~on~~ **one or more external manufacturing facilities in China will permit us to** ~~achieving~~ **achieve** a target revenue capacity ~~increase in connection with the second aerogel facility~~ of ~~over~~ **approximately** $ **650** ~~1. 2 billion~~ **million** ~~, which was the originally contemplated target revenue capacity of the first and second phases. Additionally, as a result of cost inflation and supply chain challenges for this project, we reviewed the plans, schedule and scope of the project~~ in ~~order~~ **2024 and prior** to ~~manage these~~ -- **the completion and start- up** ~~potential cost drivers with the aim~~ of ~~keeping our capital expenditures on~~ the second plant **. Nonetheless, there can be no assurance** as ~~close as possible~~ 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** ~~our~~ - **or** ~~prior estimates while still seeking to achieve our original revenue~~ **more external manufacturing facilities in China will provide us with adequate manufacturing** capacity **or supply for** ~~increases of over $ 1. 2 billion. As a result of the review of the schedule and scope of the project, we are estimating a cost of approximately $ 710. 0 million, which includes approximately $ 164. 5 million~~ that **expected demand** ~~we have spent through December 31, 2022~~ . ~~Nonetheless~~ **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 ~~estimates~~ **estimated costs for completion of** ~~. While the currently planned facilities can accommodate additional equipment in the future to further increase revenue capacity, this is not currently in scope. We expect to start up~~ the second ~~aerogel~~ plant ~~in the first- half of 2024. If, for any reason, including cost increases or our inability to obtain financing, the second manufacturing plant should fail to be~~

~~completed in a timely manner, or at all, or any of the production lines in the second manufacturing plant do not operate according to our expectations, sales may be impeded, our growth may be hindered and our business or results of operations may be materially adversely affected~~ . 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** ~~electric vehicle~~ 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 and $ 9. 9~~ million for the years ended December 31, **2023,** 2022 ~~,~~ **and** 2021 ~~and 2020~~ , 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 ~~negative~~ **positive** on an annual basis during ~~2023~~ **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 ~~ongoing~~ construction of our new plant in Bulloch County, Georgia ~~, and the ongoing construction of an automated fabrication operation in Mexico~~ . 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 ~~operating and~~ capital expenditure requirements in ~~2023~~ **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 ~~2023~~ **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. 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** ~~electric vehicle~~ adoption, our **EV** ~~electric vehicle~~ 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 ~~, or the " 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 ~~after January 1~~ **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,** ~~2023~~ **2024** ~~to September 30, 2023~~ , 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. ~~Our Loan Agreement with GM contains restrictions that limit our flexibility to operate our business. Our obligations under the Loan Agreement with GM are secured by a 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 various affirmative and negative covenants that limit our ability to engage in specified types of transactions. These covenants, which are each subject to customary exceptions, limit our ability to, without GM' s prior written consent, effect any of the following, among other things: • sell, lease, transfer or otherwise dispose of assets; • acquire another company or business or enter into a merger or similar transaction with third parties; • incur additional indebtedness; • make investments; • encumber or permit liens on certain assets; and • make restricted payments with respect to our capital stock. 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 does not provide its consent, it could adversely impact our business, financial condition and results of operations. In the event of a default under the Loan Agreement, including, among other things, our failure to make any payment when due or our failure to comply with any provision of the Loan Agreement, subject to customary grace periods set forth in the Loan Agreement, GM could elect to 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 declaration, GM could proceed against the collateral granted to it to secure the obligations under the Loan Agreement, which could have an adverse effect on our business, financial condition and results of operations.~~ 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 ~~. Our convertible note arrangement with KDT and the Loan Agreement with GM contain financial and / or operating restrictions that may limit our access to credit. Our convertible note arrangement with KDT and our Loan Agreement with GM contain certain restrictions on our ability to operate, including our ability to incur indebtedness. In addition to preventing additional borrowings under our convertible note arrangement with KDT and our Loan Agreement with GM, an event of default under either arrangement, if not cured or waived, may result in the acceleration of the maturity of indebtedness outstanding under such arrangement, which would require us to pay all amounts outstanding. Such an event may also lead our secured lender to exercise its security interest in our assets, including all of our real property and equipment at our East Providence facility. If an event of default occurs, we may not be able to cure it within any applicable cure period, if at all. If the maturity of our indebtedness is accelerated, we may not have sufficient funds available for repayment or we may not have the ability to borrow or obtain sufficient funds to replace the accelerated indebtedness on terms acceptable to us, or at all~~ . 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** ~~electric vehicle~~ 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** ~~electric vehicle~~ 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. ~~Similarly, on March 12, 2023, Signature Bank and Silvergate Capital Corp. were each swept into receivership. Although a statement by the Department of the Treasury, the Federal Reserve and the FDIC stated that all depositors of SVB would have access to all of their money, including funds held in uninsured deposit accounts, borrowers under credit agreements, letters of credit and certain other financial instruments with SVB, Signature Bank or any other financial institution that is placed into receivership by the FDIC may be unable to access undrawn amounts thereunder. If any of our counterparties to any such instruments were to be placed into receivership, we may be unable to access such funds. In addition, if any parties with whom we conduct business are unable to access funds pursuant to such instruments or lending arrangements with such a financial institution, such parties' ability to pay their obligations to us or to enter into new commercial arrangements requiring additional payments to us could be adversely affected. In this regard, counterparties to SVB credit agreements and arrangements, and third parties such as beneficiaries of letters of credit (among others), may experience direct impacts from the closure of SVB and uncertainty remains over liquidity concerns in the broader financial services industry. Similar impacts have occurred in the past, such as during the 2008- 2010 financial crisis.~~ As of ~~March 10~~ **February 29** , ~~2023~~ **2024** , we held approximately $ ~~233.~~ 2 **. 5** million of our cash and cash equivalents and restricted cash at ~~SVB and approximately € 1. 8 million of our cash at Silicon Valley Bank UK Limited, the UK affiliate of~~ 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 ~~immediately~~ -- **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 ~~or~~ **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 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 ~~estimate~~ estimates and our financial targets developed based on such estimates. 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** ~~building a second manufacturing facility in Bulloch County, Georgia. We expect to start up the second aerogel plant in the first- half of 2024. Until such time, we are reliant~~ on ~~the three production lines in~~ 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 ~~. If our existing manufacturing facility was damaged or destroyed, we would be unable to operate our business for an extended period of time and our business and results of operations may be materially adversely affected, potentially even threatening our viability~~. 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 ~~2015 and again 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. ~~While we entered into a three- year contract to secure exclusive supply of certain silanes from Silbond Corporation, most~~ **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** ~~electric vehicle~~ 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. ~~The supply chain for our materials has been increasingly global in nature. Global events such as trade wars between nations, armed conflicts, or the coronavirus outbreak could have both short- term and long- term effects on our supply chain.~~ 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 ~~constructing~~ **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 ~~. For instance, the global spread of COVID- 19, which originated in late 2019 and was later declared a pandemic by the World Health Organization in March 2020, caused certain governmental authorities worldwide to initiate " lock- down " orders for all non- essential activities, which at times, included extended shutdowns of businesses in the impacted regions. This or any further political or governmental developments or health concerns in Mexico could result in social, economic and labor instability~~ . 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. 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 ~~recent~~ 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** ~~electric vehicles~~ , 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 ~~69~~ **54** % of our ~~2022~~ **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** ~~electric vehicle~~ 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** ~~the COVID- 19 pandemic and the~~ 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** ~~electric vehicle~~ market is dependent upon consumers' willingness to purchase and use **EVs** ~~electric vehicles~~ . Our growth in the **EV** ~~electric vehicle~~ market is highly dependent upon the purchase and use by consumers of **EVs** ~~electric vehicles~~ . If the market for **EVs** ~~electric vehicles~~ 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** ~~electric vehicles~~ 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** ~~electric vehicles~~ OEMs, and changing consumer demands and behaviors. Factors that may influence the purchase and use of **EVs** ~~electric vehicles~~ include: • perceptions about **EV** ~~electric vehicle~~ 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** ~~electric vehicles~~ ; • 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** ~~electric vehicles~~ 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** ~~electric vehicles~~ generally and battery systems in particular; and • access to charging stations, standardization of **EVs** ~~electric vehicles~~ charging systems and consumers' perceptions about convenience and cost to charge an **EV** ~~electric vehicle~~ ; The influence of any of the factors described above may cause current or potential customers not to purchase **EVs** ~~electric vehicles~~ and could impact the widespread consumer adoption of **EVs** ~~electric vehicles~~ , 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. 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. ~~For example, Cabot Corporation manufactures, markets and sells a different form of aerogel insulation that is competitive with our products, particularly in the offshore oil and gas sector for use in pipe- in- pipe applications.~~ We are ~~also~~ 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 ~~. Many of our competitors are substantially larger and better capitalized than we are and possess greater financial resources~~ . 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** ~~electric vehicles~~ , using our carbon aerogel technology. Even assuming successful development of such battery materials for the **EVs** ~~electric vehicles~~ 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 ~~. This market is large with many competitors. Many of our competitors in this market are more established than we are, and have significantly greater financial, technical, marketing, and other resources than we presently possess~~ . 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** ~~electric vehicles~~ market. Failure by us to develop, maintain and strengthen strategic relationships with industry leaders to commercialize our products in the **EV** ~~electric vehicle~~ 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** ~~electric vehicle~~ market and we may therefore not be successful in establishing strategic relationships in those markets. In the **EV** ~~electric vehicle~~ 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** ~~electric vehicle~~ market. Unlike the other markets for which we have previously developed thermal solutions, the **EV** ~~electric vehicle~~ 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** ~~electric vehicle~~ 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** ~~electric vehicles~~. 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** ~~electric vehicle~~ manufacturers to realize the full potential of our Aerogel Technology Platform within the **EV** ~~electric vehicle~~ 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** ~~electric vehicle~~ 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** ~~electric vehicle~~ 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 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. 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** ~~electric vehicle~~ 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, 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. ~~Many factors~~ **Factors that** could delay, impede or prevent the construction and operation of future, potential manufacturing facilities ~~, including~~ **include** ~~in Bulloch County, Georgia or Mexico, or cause us to reduce the scale or scope of the expansion projects, including~~ : • 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; • 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; • the availability of raw materials at reasonable costs to support the levels of production that we anticipate at these facilities; ~~Any such capacity 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 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.~~ 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 2013, we redesigned and reduced the planned scale of the third production line in our East Providence, Rhode Island facility. We recorded an associated $ 3. 4 million impairment charge during 2013 to write off certain construction in progress assets. In addition~~ , 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 ~~. A redesign of, change in scale of, or failure to initiate and complete the construction of potential manufacturing facilities and other similar impairments of our assets in the future could result in a materially adverse impact on our business, results of operations, and financial condition~~ . 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. 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 ~~physical~~ **costs associated with and the resources necessary for our capacity** expansion ~~of~~ **plans could exceed** our **expectations and result in a materially adverse impact on our business, results of** operations **, financial condition,** ~~may lead to significant costs~~ and **cash flows** ~~may divert our management and business development resources~~ . 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, ~~Columbia~~ **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 and $ 55. 4 million or 55~~ % of total revenue, for the years ended December 31, **2023,** 2022 ~~,~~ **and** 2021 ~~and 2020~~ , respectively. In addition, we ~~constructed~~ **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 ~~2022~~ **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 operate on a global basis, with 37 % of our product sales in 2022 made to destinations outside of the United States, including Canada, Mexico, Europe, Asia, South America and the Middle East~~ . 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 ~~and 2020~~ , total revenue from our top ten direct customers represented **80 %,** 72 %, **and** 68 % **of our revenues** , **respectively. General Motors, LLC** and ~~66~~ **Distribution International, Inc. represented 41** % **and 14 %** of our **total** ~~revenues~~ **revenue** ~~, respectively.~~ **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 ~~; Distribution International, Inc. and SPCC Joint Venture represented 21 % and 15 % of our total revenue in 2020~~ . 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, ~~2022~~ **2023** , General Motors, LLC and Distribution International, Inc. accounted for ~~44~~ **60** % and ~~10~~ **6** % of our accounts receivable, respectively. A substantial amount of our expected sales in the EV market in ~~2023~~ **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 ~~and~~ **.** ~~these~~ **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** ~~electric vehicle~~ 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** ~~Given the history of asbestos as an insulation material, we believe that there is an elevated level of attention towards perceived health and safety risks in the insulation industry. As a consequence, 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, ~~iron oxide,~~ ethanol, **methanol** and **ammonia** ~~carbon black~~ , 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** ~~countries, particularly in Europe,~~ 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. 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. 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 ~~, including with respect to the 2022 Offering, consummation of our underwritten public offering in November 2022 and potential conversion of the convertible notes issued in 2022~~ . 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~~ 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 ~~has~~ 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 ~~short~~ **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 ~~implications~~ **foreign currency issuer default rating to AA from AAA as a result** of ~~Russia~~ **these repeated debt ceiling and budget deficit concerns. The impact of this or any further downgrades to the U. S. government** ' s ~~invasion of Ukraine are~~ **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** ~~at this time. We continue to monitor any adverse~~ impact that the **high market volatility** ~~outbreak of war in Ukraine~~ and **instability** ~~the subsequent institution~~ of ~~sanctions against Russia by~~ the **banking sector more broadly could** ~~United States and several European and Asian countries may~~ have on ~~the global economy~~ **economic activity and** ~~in general, on~~ our business ~~and operations and~~ **in particular. In addition, there is a risk that** ~~on~~ **one or more of our current service providers, external manufacturing facilities or** ~~the~~ **other third parties with which we conduct** ~~businesses~~ -- **business may not survive difficult economic times** ~~and operations of our suppliers and customers. For example~~ , ~~a prolonged~~ **the ongoing** conflict ~~may result~~ **between Russia and Ukraine, the conflict** in ~~challenges~~ **the Middle East, the instability of**

the banking sector, and the uncertainty associated with ~~timely receipt~~ **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** ~~customer~~ **customers** ~~payments~~ **could severely disrupt our operations** and **have a** ~~banking transactions, increased inflation, escalating energy prices and constrained availability, and thus increasing costs, of raw materials~~ **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 ~~will~~ **may incur substantial expenses as a result of the limited nature of our disaster recovery and business** ~~continue~~ **continuity** ~~to monitor this fluid situation and develop contingency~~ plans ~~as necessary to address any disruptions to~~ **, which could have a material adverse effect on** our business ~~operations as they develop~~ . ~~To the extent the war in Ukraine may adversely affect our business as discussed herein, it may also have the effect of heightening many of the other risks~~ **Risks Related** ~~described herein. Such risks include, but are not limited~~ to **Our Intellectual Property Our** ~~, adverse effects on macroeconomic conditions, including inflation; disruptions to our global technology infrastructure, including through cyberattack, ransom attack, or cyber- intrusion; adverse changes in international trade policies and relations; our ability~~ **inability** to ~~maintain~~ **protect** ~~or~~ **our intellectual property rights** ~~increase our product prices; disruptions in global supply chains; our exposure to foreign currency fluctuations; and constraints, volatility, or disruption in the capital markets, any of which~~ could negatively affect our business and ~~financial condition~~ **results of operations** . ~~Risks Related to Our Intellectual Property~~ 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, ~~2022~~ **2023** , we had ~~59~~ **75** issued U. S. patents and ~~196~~ **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 ~~this~~ **these** ~~action~~ **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** ~~• On June 17, 2020~~ **2023** , ~~Nano Tech~~ **Beerenberg Korea Ltd. and Bronx (China)** Co., Ltd. ~~filed~~ **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** ~~opposition~~ **composition** ~~to a recently issued Aspen Patent~~ **patents** ~~EP3120983B1~~ **asserted against Beerenberg Services AS** , **Beerenberg Korea Ltd.,** ~~titled " Continuous Sheet of Gel Materials~~ and **Bronx** ~~Continuous Sheet of Aerogel "~~ (**China** ~~983 Patent~~) **Co** . ~~On December 22~~ , ~~2021, based on~~ **Ltd. We are vigorously defending** the ~~oral hearing conducted on November 12, 2021, opposition division of EPO found the amended claims of 983 Patent to be valid~~ **validity** ~~. On May 3, 2022, the decision~~ of **our** ~~the opposition division of the EPO became final. On July 29, 2022, the opposition proceedings were terminated and on August 4, 2022 the EPO issued a decision maintaining the patent~~ **patents** ~~as amended~~ **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.** 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** ~~will take~~ 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 ~~, including clinical trial data~~ . 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. ~~If we become liable under laws or regulations applicable to us, we may be required to pay significant fines and penalties, our reputation may be harmed, and we may be forced to change the way we operate. That could require us to incur significant expenses, which could significantly affect our business. The legislative and regulatory landscape for privacy and data security continues to evolve, and there has been an increasing focus on privacy and data security issues which may affect our business.~~ 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 ~~. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives~~ . 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 ~~. Under Section 404 of the Sarbanes- Oxley Act, we have included a report of management on our internal control over financial reporting in our Form 10- K for our fiscal year ended December 31, 2022. In addition, the independent registered public accounting firm auditing our financial statements is required to attest to and report on the effectiveness of our internal control over financial reporting for the year ended December 31, 2022 and subsequent years~~ . 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~~ **Board** of ~~directors~~ **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. 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, ~~2022~~ **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, ~~2022~~ **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** ~~During the evaluation and testing process in 2021, we did not identify any material weaknesses in our internal controls over financial reporting. During the year ended December 31, 2022 management performed assessments of our recently implemented enterprise resource planning (" ERP") system, including an analysis to determine if the access and privileges granted to users were appropriately segregated. As a result of these assessments, we identified the following control deficiencies: (i) we did not design and implement effective user access controls to adequately restrict user access and the ability to modify financial data within the ERP system; and (2) we did not design and implement effective change management controls to monitor the appropriateness of changes made to the configurations of automated controls during the implementation period and the initial launch support. These control deficiencies did not result in a known misstatement of our interim financial statements. However, these control deficiencies could have resulted in material misstatements in our interim financial statements and disclosures, which then may not have been prevented or detected. Therefore, management has concluded that these control deficiencies in aggregate constituted a material weakness in our control over financial reporting. A " material weakness " is a deficiency, or a combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of our annual or interim financial statements will not be prevented or detected on a timely basis. In order to remediate the identified control deficiencies and enhance our internal control, during the year ended December 31, 2022 we adjusted accesses and privileges to provide for appropriate segregation of duties in the performance of internal controls over financial reporting. We also designed and implemented monitoring controls to detect changes within the system which would impact financial reporting. As a result of these steps, management concluded that the material weakness was remediated as of December 31, 2022. In future periods, 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, ~~2022~~ **2023**, approximately ~~25~~ **23**. ~~63~~ **3** % of our outstanding shares of common stock were held by our executive officers, directors ~~, principal~~ **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, ~~2022~~ **2023**, our executive officers, directors and ~~principal~~ **5 % or greater** stockholders and their affiliates collectively controlled approximately ~~25~~ **23**. ~~63~~ **3** % of our outstanding shares of common stock. As a result, these stockholders, if they act together, may be able to ~~control~~ **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~~ **Board** of ~~directors~~ **Directors** to create new directorships and to fill any vacancies on the ~~board~~ **Board** of ~~directors~~ **Directors**; • the ability of our ~~board~~ **Board** of ~~directors~~ **Directors** to amend our restated bylaws without stockholder approval; and • the ability of our

~~board~~ **Board** of ~~directors~~ **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~~ **Board** of ~~directors~~ **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. In addition to the ~~private placement of our common stock we completed on June 30, 2021 resulting in the issuance of 3, 462, 124 additional shares of our common stock, the ATM offerings, 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 ~~March 2022~~ issuance of ~~1~~ **6** , ~~791~~ **060** , ~~986~~ **607** shares of common stock in a **registered** ~~private placement and our issuance of 29, 052, 631 shares of common stock in an underwritten~~ public offering in ~~November~~ **December** ~~2022~~ **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~~ **Board** of ~~directors~~ **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** ~~electric vehicle~~ 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 ~~and~~ **,** the ~~anticipated job creation as a result thereof~~ **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-** ~~estimated $ 3. 9~~ 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 ~~both~~ absolute dollars and ~~as a percentage of revenue in 2023 but 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 ~~both~~ absolute dollars and ~~as a percentage of revenue in 2023 but 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 ~~both~~ absolute dollars and ~~as a percentage of revenue in 2023 but 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 ~~both~~ absolute dollars and ~~as a percentage of revenue in 2023 but 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 ~~by the first- half of 2024~~ 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.