

Ascent Solar Technologies, Inc.
Form 424B4
September 30, 2009
Table of Contents

The information in this prospectus is not complete and may be changed. This prospectus is not an offer to sell these securities and it is not soliciting an offer to buy these securities in any state where the offer or sale is not permitted.

Filed Pursuant to Rule 424(b)(4)
Registration No. 333-156665

Subject to Completion, dated September 30, 2009

PROSPECTUS SUPPLEMENT

(To Prospectus dated January 16, 2009)

4,000,000 Shares

Ascent Solar Technologies, Inc.

Common Stock

We are offering 4,000,000 shares of our common stock.

Our common stock is listed on the Nasdaq Global Market under the symbol ASTI. The last reported sale price of our common stock on September 29, 2009 was \$7.85 per share.

Investing in our common stock involves risks. See Risk Factors beginning on page S-6 of this prospectus supplement.

	Per Share	Total
Price to the public	\$	\$
Underwriting discounts and commissions	\$	\$
Proceeds to Ascent Solar Technologies, Inc. (before expenses)	\$	\$

We have granted the underwriters an option exercisable for 30 days after the date of this prospectus supplement to purchase 600,000 additional shares of common stock on the same terms and conditions set forth above.

Concurrently with this offering, we have agreed to sell to Norsk Hydro Produksjon AS (Norsk Hydro), our largest stockholder, restricted shares of our common stock for approximately \$5.0 million in a private placement exempt from registration under the Securities Act of 1933, as amended (the Concurrent Private Placement). The restricted shares will be sold to Norsk Hydro at a per share price equal to the public offering price. The purchase by Norsk Hydro is contingent upon the completion of the public offering described in this prospectus supplement.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus supplement or the accompanying prospectus. Any representation to the contrary is a criminal offense.

Barclays Capital, on behalf of the underwriters, expects to deliver the shares against payment on or about October , 2009

Barclays Capital

Cowen and Company

Raymond James

Prospectus Supplement dated October , 2009

Table of Contents

Tables of Contents

Prospectus Supplement

	Page
<u>About This Prospectus Supplement</u>	S-2
<u>Summary</u>	S-3
<u>Risk Factors</u>	S-6
<u>Forward-Looking Statements</u>	S-21
<u>Business</u>	S-23
<u>Use of Proceeds</u>	S-31
<u>Price Range of Common Stock</u>	S-31
<u>Dividend Policy</u>	S-31
<u>Capitalization</u>	S-32
<u>Dilution</u>	S-33
<u>Certain U.S. Federal Income Tax Consequences to Non-U.S. Holders of Common Stock</u>	S-34
<u>Concurrent Sale of Restricted Shares to Norsk Hydro</u>	S-36
<u>Underwriting</u>	S-37
<u>Experts</u>	S-43
<u>Legal Matters</u>	S-43
<u>Information Incorporated by Reference</u>	S-43
Prospectus	

	Page
<u>Prospectus Summary</u>	P-3
<u>Risk Factors</u>	P-4
<u>Forward-Looking Statements</u>	P-4
<u>Use of Proceeds</u>	P-6
<u>Plan of Distribution</u>	P-6
<u>Description of Securities</u>	P-7
<u>Experts</u>	P-13
<u>Legal Matters</u>	P-13
<u>Information Incorporated by Reference</u>	P-13
<u>Where You Can Find Information</u>	P-14
<u>Indemnification</u>	P-14
<u>Disclosure of Commission Position on Indemnification of Securities Act Liabilities</u>	P-15

You should rely only upon the information we have included or incorporated by reference in this prospectus supplement, the accompanying prospectus or in any free writing prospectus that we may provide you in connection with the sale of shares offered hereby. We have not, and the underwriter has not, authorized any other person to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. We are not, and the underwriter is not, making an offer to sell or seeking offers to buy this common stock in any jurisdiction where the offer or sale is not permitted. You should assume that the information appearing in this prospectus supplement, the accompanying prospectus, any document incorporated by reference therein or in any free writing prospectus that we may provide you in connection with the sale of shares offered hereby is accurate only as of the date of that document.

Table of Contents

About This Prospectus Supplement

This document consists of two parts. The first part is the prospectus supplement, which describes the specific terms of the sale of shares offered hereby. The second part is the prospectus, which describes more general information, some of which may not apply to the sale of shares offered hereby. You should read both this prospectus supplement and the accompanying prospectus, together with the documents and additional information described under the headings **Where You Can Find More Information** and **Information Incorporated by Reference**, and any free writing prospectus we may provide you in connection with this offering. If the information set forth in this prospectus supplement differs in any way from the information set forth in the accompanying prospectus, you should rely on the information set forth in this prospectus supplement.

As used in this prospectus supplement, the terms **Ascent**, **we**, **us** and **our** refer to Ascent Solar Technologies, Inc.

S-2

Table of Contents

Summary

The following summary highlights selected information contained elsewhere in this prospectus supplement, the accompanying prospectus and the documents incorporated by reference in the accompanying prospectus. It does not contain all the information you will need in making your investment decision. You should carefully read this entire prospectus supplement, the accompanying prospectus and the documents that they incorporate by reference. You should pay special attention to the Risk Factors section of this prospectus supplement. Unless otherwise expressly stated or the context otherwise requires, all information in this prospectus supplement assumes that the option granted to the underwriter to purchase additional shares of our common stock as described herein has not been exercised.

Ascent Solar Technologies, Inc.

We are a development stage company formed in October 2005 to commercialize flexible photovoltaic (PV) modules using proprietary technology. Our technology was initially developed at ITN Energy Systems, Inc. (ITN) by our founder and core scientific team beginning in 1994 and subsequently assigned and licensed to us. Our proprietary manufacturing process deposits multiple layers of materials, including a thin film of highly efficient copper-indium-gallium-diselenide (CIGS) semiconductor material, on a flexible, lightweight, plastic substrate and then laser patterns the layers to create interconnected PV cells, or PV modules, in a process known as monolithic integration. We believe that our technology and manufacturing process provide us with significant advantages over both the crystalline silicon (c-Si) based PV manufacturers that currently dominate the PV market, as well as other thin-film PV manufacturers that use rigid and/or heavier substrate materials such as glass, stainless steel or other metals. Our target markets include the building integrated PV (BIPV) market, the electronic integrated PV (EIPV) market, the military and governmental portable power markets and the space and near-space markets.

We began commercial production on our 1.5 megawatt (MW) production line in the first quarter of 2009. We have started installation of production equipment in our manufacturing facility in Thornton, Colorado. Production tooling and equipment for a 30 MW production line began arriving in the first quarter of 2009. We expect to begin production with an annual rated capacity of 15 MW in the first half of 2010, and 30 MW of annual rated capacity by the end of 2010. We intend to incrementally expand our production capacity to 110 MW or greater by adding more capacity.

We are incorporated under the laws of Delaware. Our principal business office is located at 12300 Grant Street, Thornton, Colorado 80241, and our telephone number is (720) 872-5000. Our website address is www.ascentsolar.com. Information contained on our website or any other website does not constitute part of this prospectus supplement.

Recent Developments

New Members of Management Team

Chief Executive Officer

On August 3, 2009, Farhad Moghadam, Ph.D. became our President and Chief Executive Officer. Until 2007 Dr. Moghadam served as Senior Vice President and General Manager at Applied Materials, Inc. (Applied), where, among other things, he led Applied's Thin Film Product Group, its largest business unit, and was responsible for managing over 1,100 Applied employees in the United States, Europe and Asia. Dr. Moghadam received his B.S. degree in Metallurgical Engineering from the Tehran University of Technology in Iran, and his M.S. and Ph.D. degrees in Materials Science and Engineering from Stanford University.

Table of Contents

Senior Vice President of Sales and Marketing

On September 28, 2009, Rafael Gutierrez began serving as our Senior Vice President of Sales and Marketing. Mr. Gutierrez joins us from Seagate Technology (Seagate), where he worked for 18 years, most recently as General Manager of Consumer Electronics in Seagate's Consumer Solutions Division. Mr. Gutierrez holds a M.S. in Operations Research and Applied Statistics from the University of Northern Colorado, and a B.A. in Mathematics from Bellevue University.

Securities Purchase Agreement with Norsk Hydro

Pursuant to a Securities Purchase Agreement dated as of September 29, 2009 between Norsk Hydro, our largest stockholder, and us, we have agreed to sell to Norsk Hydro restricted shares of our common stock for approximately \$5.0 million (Norsk Hydro). The restricted shares will be sold to Norsk Hydro concurrently with the closing of this offering at a per share price equal to the public offering price on the cover page of this prospectus supplement. We refer to this as the Concurrent Private Placement.

Supply Contract with TurtleEnergy

On September 21, 2009, we entered into a multi-year supply agreement with TurtleEnergy, LLC, a New Jersey limited liability company (TurtleEnergy). Pursuant to the supply agreement, we intend to sell PV modules with an aggregate capacity of approximately 67 MW to TurtleEnergy according to the following delivery schedule: approximately 1.4 MW in 2010; 5.0 MW in 2011; 10.0 MW in 2012; 24.0 MW in 2013; and 26.7 MW in 2014.

Other Contracts

On or about September 18, 2009, we signed a supply agreement with Goal Zero LLC, a Utah-based consumer products company (Goal Zero). Pursuant to the supply agreement, we intend to sell 30,700 of our Premier PV modules to Goal Zero through 2010 for incorporation into custom electronic portable power applications. On or about September 18, 2009, we signed a cooperation agreement with Energy Technologies Inc., an Ohio-based manufacturer of power generation systems for military and industrial applications. Pursuant to the agreement, the companies agreed to collaborate in the development of integrated power generation products.

This Offering

Common stock offered by us in this offering 4,000,000 shares of common stock.

Common stock outstanding after this offering and the
Concurrent Private Placement 25,794,204 shares of common stock.

Use of proceeds Expansion of our rated production capacity and for general corporate purposes.

Listing Our common stock is listed on the Nasdaq Global Market under the symbol ASTI.

Risk factors Investing in our common stock involves a high degree of risk. You should carefully consider the information set forth in the Risk Factors section of this prospectus supplement.

Table of Contents

We have granted the underwriters an option exercisable up to 30 days after the date of this prospectus supplement to purchase up to 600,000 additional shares of our common stock, on the same terms and conditions as the shares offered hereby.

As of September 23, 2009, we had 21,157,261 shares of common stock issued and outstanding. Unless the context indicates otherwise, all share and per-share common stock information in this prospectus supplement:

assumes 21,157,261 shares of common stock issued and outstanding before this offering;

assumes a public offering price of \$7.85 per share, the last reported sale price of our common stock on the Nasdaq Global Market on September 29, 2009;

assumes completion of the Concurrent Private Placement;

assumes no exercise of the underwriters' option;

assumes no exercise of approximately 10,502,583 outstanding Class B warrants;

assumes no exercise of approximately 112,500 outstanding warrants issued to the representative of the underwriters of our initial public offering, or of the 112,500 Class A warrants (which upon issuance will be immediately subject to a call for redemption by us) and 225,000 Class B warrants underlying those outstanding warrants;

excludes approximately 1,083,281 shares reserved for issuance upon exercise of outstanding options under our 2005 Stock Option Plan, as amended;

excludes 200,000 unvested options issued to our President and Chief Executive Officer outside our 2005 Stock Option Plan, as amended, as an inducement grant; and

excludes approximately 243,844 shares reserved for issuance upon vesting of unvested restricted stock units under our 2008 Restricted Stock Plan, as amended.

Table of Contents

Risk Factors

Investing in our common stock involves a high degree of risk. Before making an investment in our common stock, you should carefully consider the risk factors set forth below, together with the other information contained in this prospectus supplement, the accompanying prospectus and the documents we have incorporated by reference. If one or more of the possibilities described below actually occur, our operating results and financial condition would likely suffer and the trading price of our common stock could fall, causing you to lose some or all of your investment in the securities we are offering.

Risks Relating to Our Business

We have a limited history of operations, have not generated any revenue from operations and have not commenced commercial production of our PV modules.

We have a limited operating history and have not generated any revenue from operations. Our plans call for expansion of production capacity, but we do not expect to begin production using equipment with an annual rated production capacity of approximately 15 MW until the first half of 2010, and a full 30 MW of annual rated production capacity until the end of 2010. Our ability to achieve our business, commercialization and expansion objectives will depend on a number of factors, including whether:

we successfully begin commercial production on equipment with an annual rated production capacity of 30 MW within our planned time frame;

our products are successfully and timely certified for use in our target markets;

we successfully qualify production tools to achieve the efficiencies and yields necessary to reach our cost targets as we expand our rated production capacity;

the cost models on which we intend to rely for the manufacture of our PV modules prove accurate;

we raise sufficient capital to expand our total rated capacity to approximately 110 MW or more, and whether such capacity will enable us to reach the economies of scale we believe necessary to achieve profitability;

we receive timely delivery of production tools from our equipment suppliers;

we effectively manage the planned expansion of our operations; and

we successfully develop and maintain strategic relationships with key partners, including original equipment manufacturers (OEMs), system integrators and distributors, who deal directly with end-users in our target markets.

Each of these factors is critical to our success, and accomplishing each of these tasks may take longer or cost more than expected, or may never be accomplished. It also is likely that problems that we cannot now anticipate will arise. If we cannot overcome these problems, our business, results of operations and financial condition could be materially and adversely affected.

We have to date incurred net losses and may be unable to generate sufficient sales in the future to become profitable.

Edgar Filing: Ascent Solar Technologies, Inc. - Form 424B4

We incurred net losses of \$13.2 million in the fiscal year ended December 31, 2008 and \$8.9 million in the six months ended June 30, 2009 and reported an accumulated deficit of \$34.0 million as of June 30, 2009. We expect to incur net losses for the foreseeable future. Our ability to achieve profitability depends on a number of factors, including the growth rate of the solar energy industry, market acceptance of thin-film and other PV modules, the competitiveness of our PV modules and our ability to increase production volumes. If we are unable to generate sufficient revenue to achieve profitability and positive cash flows, we might be unable to satisfy our commitments and may have to discontinue operations. We cannot assure you that we will be successful in establishing ourselves as a profitable enterprise.

S-6

Table of Contents

Our business is based on a new and unproven technology, and if our PV modules or processes fail to achieve the performance and cost metrics that we expect, then we may be unable to develop demand for our PV modules and generate sufficient revenue to support our operations.

Our CIGS on flexible plastic substrate technology is a new and unproven technology in commercial scale production. Our business plan and strategies assume that we will be able to achieve certain milestones and metrics in terms of throughput, uniformity of cell efficiencies, yield, encapsulation, packaging, cost and other production parameters. We cannot assure you that our technology will prove to be commercially viable in accordance with our plan and strategies. Further, we may experience operational problems with such technology after its commercial introduction that could delay or defeat the ability of such technology to generate revenue or operating profits. If we are unable to achieve our targets on time and within our planned budget, then we may not be able to develop adequate demand for our PV modules, and our business, results of operations and financial condition could be materially and adversely affected.

We currently do not have certified PV modules and have recorded no sales of such products; further, we expect that significant PV module sales will not occur for some time.

We have recorded no sales of PV modules and have no contracts for such sales. Because we do not plan to commence commercial production using equipment with rated capacity of 15 MW until the first half of 2010 and equipment with total rated capacity of 30 MW until the end of 2010, and because we believe that our PV modules will need to be certified in order for them to be commercially viable for sales into certain markets, it will be several months before we record significant PV module sales, if ever. We expect that it will be some time before we can determine whether our expectations relating to our products and their target markets are justified. Further, because we will be required to invest substantial resources in pursuing our target markets in advance of any significant revenue stream that may result from such investments, an unanticipated or longer than expected delay of revenue ramp-up could put a strain on our resources, adversely affecting our business, results of operation and financial condition, and could require us to seek additional capital. See Risk Factors Our planned expansion to approximately 110 MW of rated capacity will require additional capital which we may not be able to obtain on favorable terms, if at all or without dilution to our stockholders.

Our failure to further refine our technology and develop and introduce improved PV products could render our PV modules uncompetitive or obsolete and reduce our net sales and market share.

Our success requires that we invest significant financial resources in research and development to keep pace with technological advances in the solar energy industry. However, research and development activities are inherently uncertain, and we could encounter practical difficulties in commercializing our research results. Our expenditures on research and development may not be sufficient to produce the desired technological advances, or they may not produce corresponding benefits. Our PV modules may be rendered obsolete by the technological advances of our competitors, which could harm our results of operations and adversely impact our net sales and market share.

If the supply of PV modules exceeds the demand for those modules, then we may be forced to reduce the price of our PV modules in order to compete effectively.

Some industry reports forecast overcapacity in the PV module market in ensuing years. In an overcapacity scenario, the supply of PV modules by manufacturers would outstrip demand for those products. If either the overall PV module market or our target markets encounter an overcapacity scenario, we may be forced to scale back production or reduce the price of our PV modules in order to generate sales. In either case, our business, results of operations and financial condition could be materially and adversely affected.

Table of Contents

A significant increase in the supply of silicon feedstock or the significant reduction in the manufacturing cost of c-Si-based PV modules could lead to pricing pressures on PV modules generally and force us to reduce the sales price of our PV modules.

During 2008 there was a significant increase in the supply of silicon feedstock and a significant reduction in the cost of c-Si-based PV modules. This led to pricing pressures on PV modules generally. In the face of such current and future downward pricing pressures, we might be forced to reduce the sales prices of our PV modules, which, absent a commensurate decrease in our manufacturing costs, could materially and adversely affect our results of operations and financial condition and prevent us from achieving profitability.

A failure or unanticipated delay in securing any necessary or desired certification for our PV modules from government or regulatory organizations could impair sales of our PV modules and materially and adversely affect our results of operations and financial condition.

In order for our PV modules to be commercially sold for use in certain target markets, they must first be certified by certain government or regulatory organizations, such as Underwriters Laboratory (UL) and Technischer Überwachungs-Verein (TÜV). We believe that in some cases, these certifications would be sought by our customers and, in other cases, by us. A failure or unanticipated delay in securing any necessary or desired certification for our PV modules could impair sales of our PV modules and materially and adversely affect our business, results of operations and financial condition.

Existing regulations and policies and changes to these regulations and policies may present technical, regulatory and economic barriers to the purchase and use of PV products, which may significantly reduce demand for our PV modules.

The market for electricity generation products is heavily influenced by foreign, federal, state and local government regulations and policies concerning the electric utility industry, as well as policies promulgated by electric utilities. These regulations and policies often relate to electricity pricing and technical interconnection of customer-owned electricity generation. In the United States and in a number of other countries, these regulations and policies have been modified in the past and may be modified again in the future. These regulations and policies could deter end-user purchases of PV products and investment in the research and development of PV technology. For example, without a mandated regulatory exception for PV systems, utility customers are often charged interconnection or standby fees for putting distributed power generation on the electric utility grid. These fees could increase the cost to our end-users of using PV systems and make them less desirable, thereby harming our business, prospects, results of operations and financial condition. In addition, electricity generated by PV systems mostly competes with expensive peak hour electricity, rather than the less expensive average price of electricity. Modifications to the peak hour pricing policies of utilities, such as to a flat rate, would require PV systems to achieve lower prices in order to compete with the price of electricity from other sources.

We anticipate that our PV modules and their use in installations will be subject to oversight and regulation in accordance with national and local ordinances relating to building codes, safety, environmental protection, utility interconnection and metering and related matters. It is difficult to track the requirements of individual states and design equipment to comply with the varying standards. Any new government regulations or utility policies pertaining to PV modules may result in significant additional expenses to us, our business partners and their customers and, as a result, could cause a significant reduction in demand for our PV modules.

Failure to receive timely delivery of production tools from our equipment suppliers could delay our planned expansion of manufacturing capacity and materially and adversely affect our results of operations and financial condition.

Our planned expansion of manufacturing capacity and commercialization timeline depend on the timely delivery of production tools from our equipment suppliers. The relationships with our chosen equipment suppliers are relatively new, and at this point in time we cannot be certain that the equipment orders we place with these suppliers will be fulfilled as we expect or in a timely manner. If delivery of production tools is not

Table of Contents

made on schedule or at all, then we might be unable to carry out our commercialization and manufacturing expansion plans, produce PV modules in the volumes and at the times that we expect or generate sufficient revenue from operations, and our business, results of operations and financial condition could be materially and adversely affected.

Failure to expand our manufacturing capacity successfully would adversely impact our ability to sell PV modules into our target markets and would materially and adversely affect our business, results of operations and financial condition.

Our growth plan calls for the installation and operation of additional production tools to achieve the manufacturing capacities and cost efficiencies necessary to compete in our target markets. The successful completion and operation of future production tools will require substantial engineering resources and is subject to significant risks, including risks of cost overruns and delays, risks that we may not be able to successfully acquire, install, combine or operate the equipment needed, or the possibility that one or more of the production tools may never be qualified or become operational. Furthermore, we may never be able to operate our production processes in high volume, make planned process and equipment improvements, attain projected manufacturing yields or desired annual capacity, obtain timely delivery of production tools, obtain on reasonable terms adequate facilities in which to install the production tools, or hire and train the additional employees and management needed to operate and maintain the production tools. Failure to meet these objectives on time and within our planned budget could materially and adversely affect our business, results of operations and financial condition.

Failure to consummate strategic relationships with key partners in our various target market segments, such as portable power applications for military and governmental agencies or space and near-space high value added solar applications markets as well as the unique BIPV and EIPV markets, and the respective implementations of the right strategic partnerships to enter these various specified markets, could adversely affect our projected sales, growth and revenues.

We intend to sell thin-film PV modules for use in BIPV and EIPV products, such as roofing shingles, siding and facades, metal and composite panels, roofing membranes, electronic packages, casings and accessories, as well as for military and governmental portable power systems and space and near-space solar panel applications. Our marketing and distribution strategy is to form strategic relationships with suppliers to provide a foothold in these target markets. If we are unable to successfully establish working relationships with such market participants or if due to cost, technical or other factors, our PV modules prove unsuitable for use in such applications; our projected revenues and operating results could be adversely affected. Further, to the extent that we are able to establish strategic relationships with key partners and distributors, those relationships may be on a non-exclusive basis (for example, our strategic relationship with Norsk Hydro is non-exclusive), which means that our partners are not obligated to use us as their sole source of PV modules, and may instead choose to use the products of our competitors. Any such reduction in demand for our PV modules may have a material adverse effect on our revenues, results of operations and financial condition.

Our planned expansion to approximately 110 MW or more of rated capacity will require additional capital which we may not be able to obtain on favorable terms, if at all or without dilution to our stockholders.

Our planned expansion to approximately 110 MW or more of total rated capacity will require additional capital. We currently are unable to determine what forms of financing, if any, will be available to us. If we raise additional funds through the issuance of equity or convertible debt securities, the percentage ownership of our existing stockholders could be significantly diluted, and these newly issued securities may have rights, preferences or privileges senior to those of existing stockholders. If we raise additional funds through debt financing, which may involve restrictive covenants, our ability to operate our business may be restricted. We cannot assure you that additional financing will be available on terms favorable to us, or at all. If adequate funds

Table of Contents

are not available or are not available on acceptable terms, if and when needed, our ability to fund our operations, take advantage of unanticipated opportunities, develop or enhance our products, expand capacity to approximately 110 MW or more of total rated capacity, or otherwise respond to competitive pressures could be significantly limited, and our business, results of operations and financial condition could be materially and adversely affected.

In addition, the terms of a loan we obtained from the Colorado Housing and Finance Authority (CHFA) in connection with our purchase and improvement of our Thornton, Colorado facility contain covenants that limit our ability, without the consent of CHFA, to create or incur additional indebtedness (other than obligations created or incurred in the ordinary course of business); merge or consolidate with any other entity; or make loans or advances to our officers, shareholders, directors or employees. The presence of these negative covenants gives CHFA the ability to bar us from engaging in certain transactions in the future that we may determine are necessary or advisable to meet our business objectives, including debt offerings and acquisitions of or by other companies. If CHFA were to withhold its written consent under these or other circumstances, we could be forced to prepay such loans at a premium, which could adversely affect our business, results of operation and financial condition.

We may be unable to manage the expansion of our operations effectively.

We will need to significantly expand our operations in order to reduce the incremental manufacturing costs of our PV modules, secure contracts of commercially material amounts with reputable customers and capture a meaningful share of our target markets. To manage the rapid expansion of our operations, we will be required to improve our operational and financial systems, procedures and controls and expand, train and manage our growing employee base. Our management team will also be required to maintain and cultivate our relationships with customers, suppliers and other third parties and attract new customers and suppliers. In addition, our current and planned operations, personnel, facility size and configuration, systems and internal procedures and controls might be inadequate or insufficient to support our future growth. If we cannot manage our growth effectively, we may be unable to take advantage of market opportunities, execute our business strategies or respond to competitive pressures, resulting in a material and adverse effect to our business, results of operations and financial condition.

If the U.S. government terminates or delays any of our revenue-generating contracts with it, then the reduced funding could materially and adversely affect our results of operation and financial condition.

To date, we have relied heavily upon contracts with the U.S. government and federal agencies for our revenues and to fund our research and development activities. The U.S. government, as a counterparty to our agreements, generally has the right to unilaterally terminate or modify these contracts. If the U.S. government terminates or delays any of our contracts with it for example, because of changed government priorities, budgets or appropriations then our ability to perform or adequately fund ongoing research and development activities may be adversely affected. Further, such termination or delay could materially and adversely affect our results of operation and financial condition.

The recent financial crisis could negatively affect our business, results of operations, and financial condition.

The recent financial crisis affecting the banking system and financial markets has resulted in a tightening in the credit markets; a low level of liquidity in many financial markets; and extreme volatility in credit, fixed income, and equity markets. There could be a number of follow-on effects from the credit crisis on our business, including increased expense or inability to obtain debt financing or raise additional capital; insolvency of key suppliers, resulting in product delays; inability of customers to obtain credit to finance purchases of our products; and/or customer insolvencies. The current volatility in the financial markets and continued economic uncertainty increase the risk that the actual amounts realized in the future on our assets will differ significantly from the fair values currently assigned to them.

Table of Contents

Our PV modules may never gain market acceptance, in which case we would be unable to sell our PV modules or achieve profitability.

Demand for our PV modules may never develop, and our PV modules may never gain market acceptance, if we fail to produce PV modules that compete favorably against competing products on the basis of cost, quality, weight, efficiency and performance. Demand for our PV modules also will depend on our ability to develop and maintain successful relationships with key partners, including OEMs, system integrators and distributors. If our PV modules fail to gain market acceptance as quickly as we envision or at all, our business, results of operations and financial condition could be materially and adversely affected.

If sufficient demand for PV solutions does not develop or takes longer to develop than we anticipate, we may be unable to grow our business, generate sufficient revenue to attain profitability or continue operations.

The solar energy industry is at a relatively early stage of development, and the extent to which PV modules, including our own, will be widely adopted is uncertain. If PV technology proves unsuitable for widespread adoption or if demand for PV modules fails to develop sufficiently, we may be unable to grow our business, generate sufficient sales to attain profitability or continue operations. Many factors, many of which are outside of our control, may affect the viability of widespread adoption of PV technology and demand for PV modules, including:

the cost effectiveness of PV modules and installed PV systems relative to other renewable energy sources, such as wind, geothermal, tidal power and other PV technologies;

the cost effectiveness of PV modules and installed PV systems relative to conventional carbon-based and other energy sources, such as coal, oil, natural gas and nuclear, and whether the levelized cost of PV can approach that of these conventional energy sources;

whether PV-generated power reaches grid parity in the geographic markets where our products will be used;

the availability and amount of government subsidies and incentives to support development of the solar energy industry;

the deregulation of the electric power industry and the broader energy industry;

the emergence of other disruptive technologies in the energy industry;

the ease with which PV solutions can penetrate and adapt to existing energy industry infrastructure;

the availability of raw materials used in the manufacture of PV products; and

availability of capital to fund development of technology in the solar energy market.

Reduced growth in or the reduction, elimination, modification or expiration of government subsidies and economic incentives for solar electricity applications could reduce demand for our products.

National, regional and local governmental bodies in many countries, most notably Germany, Italy, Spain, France, South Korea, Japan, Canada and the United States, have provided support in the form of feed-in tariffs, rebates, tax write-offs and other incentives to end-users, distributors, system integrators and manufacturers of PV products. If any of these subsidies or incentives is discontinued, reduced or substantially modified, if growth in any such subsidies or incentives is reduced, or if renewable portfolio standards or similar production requirements are changed or eliminated, demand for our PV modules in the affected country or countries could decline or never develop, and our results of operations and

financial condition could be materially and adversely affected as a result.

S-11

Table of Contents

We face intense competition from manufacturers of c-Si-based PV modules, other manufacturers of thin-film PV modules and other companies in the solar energy industry.

The solar energy and renewable energy industries are both highly competitive and continually evolving as participants strive to distinguish themselves within their markets and compete with the larger electric power industry. We believe that our main sources of competition are c-Si PV manufacturers, other thin-film PV manufacturers and companies developing other solar solutions, such as solar thermal and concentrated PV technologies.

The thin-film component of the industry is largely made up of a broad mix of technology platforms at various stages of development, and consists of a large and growing number of medium- and small-sized companies. Two of the largest thin-film PV manufacturers are First Solar, Inc. (First Solar) and Energy Conversion Devices, Inc., (Energy Conversion) each of which has reported an installed capacity of 100 MW or greater. First Solar manufactures PV modules using cadmium telluride (CdTe) affixed to glass. Energy Conversion manufactures PV modules using amorphous silicon (a-Si) affixed to flexible metal foil. Competitors currently developing or selling CIGS-based PV modules include AVANCIS GmbH & Co. KG, Global Solar Energy, Inc., HelioVolt Corporation, Honda Soltec Co. Ltd., MiaSolé, NanoSolar, Inc., Solibro GmbH, Solyndra, Inc., SoloPower, Inc. and Würth Solar GmbH & Co. We believe that a number of manufacturers that traditionally have manufactured and sold c-Si-based modules have entered, or in the future may enter, the market for thin-film PV modules and, potentially, CIGS-based PV modules.

Many of our existing and potential competitors have substantially greater financial, technical, manufacturing and other resources than we do. A competitor's greater size provides them with a competitive advantage because they often can realize economies of scale and purchase certain raw materials at lower prices. Many of our competitors also have greater brand name recognition, established distribution networks and large customer bases. In addition, many of our competitors have well-established relationships with our current and potential partners and distributors and have extensive knowledge of our target markets. As a result of their greater size, these competitors may be able to devote more resources to the research, development, promotion and sale of their products or respond more quickly to evolving industry standards and changes in market conditions than we can. Our failure to adapt to changing market conditions and to compete successfully with existing or future competitors could materially and adversely affect our business, results of operations and financial condition.

The interests of our largest stockholder, Norsk Hydro, may conflict with our interests or your interests now or in the future.

Norsk Hydro currently owns approximately 35% of all issued and outstanding shares of our common stock. See Certain Relationships and Related Transactions, and Director Independence Transactions Involving Norsk Hydro Produksjon AS in our Annual Report for the fiscal year ended December 31, 2008. Norsk Hydro has agreed to purchase approximately \$5.0 million of our common stock in the Concurrent Private Placement. As a result of its large holding of our shares, Norsk Hydro may have the ability to prevent any transaction that requires the approval of stockholders regardless of whether other stockholders believe that any such transaction is in their own best interests. Additionally, Norsk Hydro currently holds two seats on our Board of Directors, which afford Norsk Hydro greater control and influence over matters affecting our business.

Norsk Hydro may from time to time acquire and hold interests in businesses that compete directly or indirectly with us. Norsk Hydro also may pursue opportunities (including by acquisition) that may be adverse to, or be in direct or indirect competition with, us. Additionally, our potential customers may be competitors of Norsk Hydro and our interests in selling to those customers could be divergent from Norsk Hydro's competitive interests. So long as Norsk Hydro continues to own a significant amount of the outstanding shares of our common stock, Norsk Hydro may be able to strongly influence or effectively control our decisions.

Table of Contents

Currency translation risk may negatively affect our net sales, cost of equipment, cost of sales, gross margin or profitability and could result in exchange losses.

Although our reporting currency is the U.S. dollar, we may conduct business and incur costs in the local currencies of other countries in which we operate, make sales or buy equipment or materials. As a result, we are subject to currency translation risk. For example, in 2007 we purchased equipment from suppliers in Japan, the United Kingdom and Germany, and our capital expenditures exceeded budgeted amounts due to the decline of the U.S. dollar versus the British pound and the euro. We continue to be exposed to Japanese Yen-based currency risk. The majority of our equipment contracts in 2008 and 2009 were hedged to protect us against fluctuations in currency exchange rates. However, our future contracts and obligations may be exposed to fluctuations in currency exchange rates; and, as a result, our capital expenditures or other costs may exceed what we have budgeted. Further, changes in exchange rates between foreign currencies and the U.S. dollar could affect our net sales and cost of sales and could result in exchange losses. We cannot accurately predict future exchange rates or the overall impact of future exchange rate fluctuations on our business, results of operations and financial condition.

We depend on a limited number of third-party suppliers for key raw materials, and their failure to perform could cause manufacturing delays and impair our ability to deliver PV modules to customers in the required quality and quantity and at a price that is profitable to us.

Our failure to obtain raw materials and components that meet our quality, quantity and cost requirements in a timely manner could interrupt or impair our ability to manufacture our PV modules or increase our manufacturing cost. Most of our key raw materials are either sole-sourced or sourced by a limited number of third-party suppliers. As a result, the failure of any of our suppliers to perform could disrupt our supply chain and impair our operations. For example, we currently obtain our plastic substrate material solely from Ube Industries, Ltd. (Japan), and we have qualified only one type of encapsulation material for use with our PV modules, although we are actively identifying and evaluating additional suppliers of these materials. In addition, many of our suppliers are small companies that may be unable to supply our increasing demand for raw materials as we implement our planned expansion. We may be unable to identify new suppliers in a timely manner or on commercially reasonable terms. Raw materials from new suppliers may also be less suited for our technology and yield PV modules with lower conversion efficiencies, higher failure rates and higher rates of degradation than PV modules manufactured with the raw materials from our current suppliers.

Any change to our relationship with ITN could disrupt certain aspects of our business operations, including our research and development activities.

Pursuant to a Service Center Agreement in place until December 31, 2009, we have the right to use certain of ITN's laboratories, equipment and research and development tools on an as needed basis. Also, pursuant to an Administrative Services Agreement in place until December 31, 2009, ITN provides us with certain administrative services at cost, such as facilities management, equipment maintenance, procurement, information technology and technical support. See Certain Relationships and Related Transactions, and Director Independence Transactions with ITN Energy Systems, Inc. in our Annual Report for the fiscal year ended December 31, 2008. We intend to renew these agreements as and when they expire if we determine that the services are still needed or warranted. We have relied on these arrangements to conduct a large portion of our research and development activities, including those related to development and improvements of new PV technologies that may affect the viability of our products in the future. We also have relied on these arrangements for back office support services at what we believe are competitive prices. Although we expect the value of these agreements with ITN to diminish significantly with time as we hire additional personnel and internalize many of the functions previously outsourced to ITN, any change to our existing relationship with ITN, including the sale of ITN to a third party or termination or alteration of the Service Center Agreement or Administrative Services Agreement, could disrupt our research and development activities and other aspects of our business. Among other things, we may be forced to seek and obtain access to different sources of laboratory equipment and tools, or we may be forced to find alternative providers of affected administrative services, or to perform administrative

Table of Contents

services ourselves. We cannot guarantee that we would be able to do so on the same or as favorable terms than we currently have with ITN, or at all; and the increased costs of alternative arrangements may materially and adversely affect our business, results of operations and financial condition.

Our future success depends on retaining our existing management team and hiring and assimilating new key employees and our inability to attract or retain key personnel would materially harm our business and results of operations.

Our success depends on the continuing efforts and abilities of our executive officers, including Dr. Farhad Moghadam, our President and Chief Executive Officer, Dr. Mohan Misra, our Chief Strategy Officer, Dr. Prem Nath, our Senior Vice President of Production Operations, and Dr. Joseph Armstrong, our Chief Technology Officer. Our future success also will depend on our ability to attract and retain highly skilled employees, including management, technical and sales personnel. The loss of any of our key personnel, the inability to attract, retain or assimilate key personnel in the future, or delays in hiring required personnel could materially harm our business, results of operations and financial condition.

Problems with product quality or performance may cause us to incur warranty expenses, damage our market reputation and prevent us from maintaining or increasing our market share.

We do not have sufficient life cycle data for our thin-film PV modules to reliably predict their lifespan in the field. Pending collection of such data over time, we may not be able to offer customers warranty terms equivalent to those of our competitors, which may adversely impact sales or market acceptance of our PV modules. Further, even if we offer warranty terms equivalent to those of our competitors, at this time we cannot guarantee that our PV modules will perform as expected during the lifespan that our customers will expect. If our PV modules fail to perform as expected while under warranty, or if we are unable to support the warranties, sales of our PV modules may be adversely affected or our costs may increase, and our business, results of operations and financial condition could be materially and adversely affected.

We may also be subject to warranty or product liability claims against us that are not covered by insurance or are in excess of our available insurance limits. In addition, quality issues can have various other ramifications, including delays in the recognition of revenue, loss of revenue, loss of future sales opportunities, increased costs associated with repairing or replacing products, and a negative impact on our goodwill and reputation. The possibility of future product failures could cause us to incur substantial expenses to repair or replace defective products. Furthermore, widespread product failures may damage our market reputation and reduce our market share and cause sales to decline.

Our PV modules contain limited amounts of cadmium sulfide, and claims of human exposure or future regulations could have a material adverse effect on our business, results of operations and financial condition.

Our PV modules contain limited amounts of cadmium sulfide, which is regulated as a hazardous material due to the adverse health effects that may arise from human exposure. We cannot assure you that human or environmental exposure to cadmium sulfide used in our PV modules will not occur. Any such exposure could result in third-party claims against us, damage to our reputation and heightened regulatory scrutiny of our PV modules. Future regulation relating to the use of cadmium in various products could force us to seek regulatory exemptions or impact the manufacture and sale of our PV modules and could require us to incur unforeseen environmental-related costs. The occurrence of future events such as these could limit our ability to sell and distribute our PV modules, and could have a material adverse effect on our business, results of operations and financial condition.

Table of Contents

Environmental obligations and liabilities could have a substantial negative impact on our financial condition, cash flows and profitability.

We are subject to a variety of federal, state, local and foreign laws and regulations relating to the protection of the environment, including those governing the use, handling, generation, processing, storage, transportation and disposal of, or human exposure to, hazardous and toxic materials, the discharge of pollutants into the air and water, and occupational health and safety. We are also subject to environmental laws which allow regulatory authorities to compel, or seek reimbursement for, cleanup of environmental contamination at sites now or formerly owned or operated by us and at facilities where our waste is or has been disposed. We may incur significant costs and capital expenditures in complying with these laws and regulations. In addition, violations of, or liabilities under, environmental laws or permits may result in restrictions being imposed on our operating activities or in our being subjected to substantial fines, penalties, criminal proceedings, third party property damage or personal injury claims, cleanup costs or other costs. Also, future developments such as more aggressive enforcement policies, the implementation of new, more stringent laws and regulations, or the discovery of presently unknown environmental conditions or non-compliance may require expenditures that could have a material adverse effect on our business, results of operations and financial condition. Further, greenhouse gas emissions have increasingly become the subject of international, national, state and local attention. Although future regulations could potentially lead to an increased use of alternative energy, there can be no guarantee that such future regulations will encourage solar technology. Given our limited history of operations, it is difficult to predict future environmental expenses.

Our intellectual property rights or our means of enforcing those rights may be inadequate to protect our business, which may result in the unauthorized use of our products or reduced sales or otherwise reduce our ability to compete.

Our business and competitive position depends upon our ability to protect our intellectual property rights and proprietary technology, including any PV modules that we develop. We attempt to protect our intellectual property rights, both in the United States and in foreign countries, through a combination of patent, trade secret and other intellectual property laws, as well as licensing agreements and third-party nondisclosure and assignment agreements. Because of the differences in foreign patent and other laws concerning intellectual property rights, our intellectual property rights may not receive the same degree of protection in foreign countries as they would in the United States. Our failure to obtain or maintain adequate protection of our intellectual property rights for any reason could have a material adverse effect on our business, results of operations and financial condition. Further, any patents issued in connection with our efforts to develop new technology for PV modules may not be broad enough to protect all of the potential uses of our technology.

We have applied for patent protection in the United States relating to certain existing and proposed technologies and processes and services. While we generally apply for patents in those countries where we intend to make, have made, use, or sell patented products, we may not accurately predict all of the countries where patent protection will ultimately be desirable. If we fail to timely file a patent application in any such country, we may be precluded from doing so at a later date. Furthermore, we cannot assure you that any of our patent applications will be approved. We also cannot assure you that the patents issued as a result of our foreign patent applications will have the same scope of coverage as our U.S. patents. The patents we own could be challenged invalidated or circumvented by others and may not be of sufficient scope or strength to provide us with any meaningful protection or commercial advantage. Further, we cannot assure you that competitors will not infringe our patents, or that we will have adequate resources to enforce our patents.

Many patent applications in the United States are maintained in secrecy for a period of time after they are filed, and since publication of discoveries in the scientific or patent literature tends to lag behind actual discoveries by several months, we cannot be certain that we will be the first creator of inventions covered by any patent application we make or that we will be the first to file patent applications on such inventions. Because some patent applications are maintained in secrecy for a period of time, there is also a risk that we could adopt a technology without knowledge of a pending patent application, which technology would infringe a third party patent once that patent is issued.

Table of Contents

We also rely on unpatented proprietary technology. It is possible that others will independently develop the same or similar technology or otherwise obtain access to our unpatented technology. To protect our trade secrets and other proprietary information, we require our employees, consultants and advisors to execute proprietary information and invention assignment agreements when they begin working for us. We cannot assure you that these agreements will provide meaningful protection of our trade secrets, know-how or other proprietary information in the event of any unauthorized use, misappropriation or disclosure of any such trade secrets, know-how or other proprietary information. Despite our efforts to protect this information, unauthorized parties may attempt to obtain and use information that we regard as proprietary. If we are unable to maintain the proprietary nature of our technologies, we could be materially adversely affected.

Although we rely on copyright laws to protect the works of authorship created by us, we do not register the copyrights in all of our copyrightable works. Copyrights of U.S. origin must be registered before the copyright owner may bring an infringement suit in the United States. Furthermore, if a copyright of U.S. origin is not registered within three months of publication of the underlying work, the copyright owner is precluded from seeking statutory damages or attorneys' fees in any United States enforcement action, and is limited to seeking actual damages and lost profits. Accordingly, if one of our unregistered copyrights of U.S. origin is infringed by a third party, we will need to register the copyright before we can file an infringement suit in the United States, and our remedies in any such infringement suit may be limited.

In addition, when others control the prosecution, maintenance and enforcement of certain important intellectual property, such as technology licensed to us, the protection and enforcement of the intellectual property rights may be outside of our control. If the entity that controls intellectual property rights that are licensed to us does not adequately protect those rights, our rights may be impaired, which may impact our ability to develop, market and commercialize our products. Further, if we breach the terms of any license agreement pursuant to which a third party licenses us intellectual property rights, our rights under that license may be affected and we may not be able to continue to use the licensed intellectual property rights, which could adversely affect our ability to develop, market and commercialize our products. Some of our license agreements are not assignable by us without the licensor's consent, which may impair our ability to transfer our business or our assets in connection with a merger, acquisition or otherwise.

Further, some of our patents and related know how and other technology may cover inventions that were conceived or first reduced to practice under, or in connection with, U.S. government contracts or other federal funding agreements. Although we retain ownership of intellectual property developed by us during the performance of government contracts, the U.S. government typically has a nonexclusive, non-transferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the U.S. the invention throughout the world. Further, the federal government may retain the right to impose a compulsory license in certain circumstances through the exercise of "march-in" rights under which it can compel us to license the intellectual property. If the government were to exercise "march-in" rights, we could be forced to license intellectual property developed by us on terms unfavorable to us, and our business could be materially and adversely affected. Furthermore, our ability to exclusively license or assign the intellectual property developed under these federal funding agreements to third parties may be limited or subject to the U.S. government's approval or oversight. These limitations could have a significant impact on the commercial value of the developed intellectual property in the U.S., and similar rights may be present in other countries. If one or more governments should exercise such rights, our ability to achieve profitability could be compromised and our business prospects harmed. Some U.S. government funding and/or license agreements require that products made using the subject intellectual property for use or sale in the United States be substantially manufactured in the United States. This may impair our ability to lower manufacturing costs or otherwise take advantage of opportunities to manufacture products outside of the United States.

Our means of protecting our intellectual property rights may not be adequate. Our competitors may: independently develop substantially equivalent proprietary information, products and techniques; or otherwise gain access to our proprietary information or design around our patents or other intellectual property, which could result in significant costs or substantial damages to our business and our inability to manufacture, market

Table of Contents

or sell our products. Furthermore, policing unauthorized use of our patented or proprietary technology can be difficult and expensive. Litigation may be necessary to enforce our intellectual property rights, protect our trade secrets or determine the validity and scope of the proprietary rights of others. We cannot assure you that the outcome of such potential litigation will be in our favor. Such litigation may be costly and may divert management attention and other resources away from our business. An adverse determination in any such litigation will impair our intellectual property rights and may harm our business, prospects and reputation. In addition, we have no insurance coverage against litigation costs and would have to bear all costs arising from such litigation to the extent we are unable to recover them from other parties.

If third parties claim that we are infringing or misappropriating their intellectual property rights, we could be prohibited from selling our PV modules, be required to obtain licenses from third parties or be forced to develop non-infringing alternatives, and we could be subject to substantial monetary damages and injunctive relief.

The PV industry is characterized by the existence of a large number of patents and frequent litigation based on allegations of patent infringement. We are aware of numerous issued patents and pending patent applications owned by third parties that may relate to current and future generations of solar energy. The owners of these patents may assert that the manufacture, use or sale of any of our products infringes one or more claims of their patents. Moreover, because patent applications can take many years to issue, there may be currently pending applications, unknown to us, which may later result in issued patents that materially and adversely affect our business. Third parties could also assert claims against us that we have infringed or misappropriated their intellectual property rights. Whether or not such claims are valid, we cannot be certain that we have not infringed the intellectual property rights of such third parties. Any infringement or misappropriation claim could result in significant costs or substantial damages to our business or an inability to manufacture market or sell any of our PV modules that are found to infringe or misappropriate. Even if we were to prevail in any such action, the litigation could result in substantial cost and diversion of resources that could materially and adversely affect our business. The large number of patents, the rapid rate of new patent issuances, the complexities of the technology involved and uncertainty of litigation increase the risk of business assets and management's attention being diverted to patent litigation. Even if obtaining a license were feasible, it could be costly and time consuming. We might be forced to obtain additional licenses from our existing licensors in the event that the scope of the intellectual property we have licensed is too narrow to cover our activities, or in the event that the licensor did not have sufficient rights to grant us the license(s) purportedly granted. Also, some of our licenses may restrict or limit our ability to grant sublicenses and/or assign rights under the licenses to third parties, which may limit our ability to pursue business opportunities.

We currently anticipate having substantial international operations that will subject us to a number of risks, including potential unfavorable political, regulatory, labor and tax conditions in foreign countries.

We expect to expand our operations abroad in the future and, as a result, we may be subject to the legal, political, social and regulatory requirements and economic conditions of foreign jurisdictions. Risks inherent to international operations, include, but are not limited to, the following:

difficulty in procuring supplies and supply contracts abroad;

difficulty in enforcing agreements in foreign legal systems;

foreign countries imposing additional withholding taxes or otherwise taxing our foreign income, imposing tariffs or adopting other restrictions on foreign trade and investment, including currency exchange controls;

inability to obtain, maintain or enforce intellectual property rights;

risk of nationalization;

changes in general economic and political conditions in the countries in which we may operate, including changes in the government incentives we might rely on;

Table of Contents

unexpected adverse changes in foreign laws or regulatory requirements, including those with respect to environmental protection, export duties and quotas;

difficulty with staffing and managing widespread operations;

trade barriers such as export requirements, tariffs, taxes and other restrictions and expenses, which could increase the prices of our products and make us less competitive in some countries; and

difficulty of and costs relating to compliance with the different commercial and legal requirements of the international markets in which we plan to offer and sell our PV modules.

Our business in foreign markets will require us to respond to rapid changes in market conditions in these countries. Our overall success as an international business depends, in part, on our ability to succeed in differing legal, regulatory, economic, social and political conditions. If we are not be able to develop and implement policies and strategies that are effective in each location where we will do business, then our business, results of operations and financial condition could be materially and adversely affected.

Our failure to secure proper sites and facilities in which to install manufacturing equipment could adversely affect our business and results of operations.

We intend to install manufacturing equipment both domestically and abroad. Selecting suitable locations for this equipment requires consideration of a variety of factors, including availability of a skilled workforce, size and configuration of facilities, proximity to customers, transportation and infrastructure, cost of land and facilities, currency exchange rates and the prevailing political and regulatory environment. A variety of factors related to the location and selection of such sites and facilities could cause our operations to miss our expectations, and adversely affect our business, results of operations and financial condition.

Our failure to qualify for Small Business Innovation Research funding could adversely impact our revenues from research and development contracts; further, upon the exercise of march-in rights by the federal government, we could be forced to license intellectual property developed by us on terms unfavorable to us.

We currently receive funding for research and development under the Small Business Innovation Research (SBIR) program. In 2008, our revenues generated from performance of these contracts totaled approximately \$1.5 million. In order to continue to qualify for this funding, we must, among other things, remain American-owned and independently operated and our size must remain under 500 employees. As a result of our relationship with Norsk Hydro and our planned expansion plans, we cannot guarantee that we will be able to continue to qualify for SBIR funding. If we fail to qualify for SBIR funding, our revenues from research and development could decline or cease, and our net income and financial condition could be could materially and adversely affected.

As a public company we are subject to complex legal and accounting requirements that require us to incur substantial expenses, and our financial controls and procedures may not be sufficient to ensure timely and reliable reporting of financial information, which, as a public company, could materially harm our stock price and listing on the Nasdaq Global Market.

As a public company, we are subject to numerous legal and accounting requirements that do not apply to private companies. The cost of compliance with many of these requirements is substantial, not only in absolute terms but, more importantly, in relation to the overall scope of the operations of a small company. Our relative inexperience with these requirements may increase the cost of compliance and may also increase the risk that we will fail to comply. Failure to comply with these requirements can have numerous adverse consequences including, but not limited to, our inability to file required periodic reports on a timely basis, loss of market confidence, delisting of our securities and/or governmental or private actions against us. We cannot assure you that we will be able to comply with all of these requirements or that the cost of such compliance will not prove to be a substantial competitive disadvantage vis-à-vis our privately held and larger public competitors.

Table of Contents

The Sarbanes-Oxley Act of 2002 (Sarbanes-Oxley) requires, among other things, that we maintain effective internal control over financial reporting and disclosure controls and procedures. In particular, we must perform system and process evaluation and testing of our internal control over financial reporting to allow management and our independent registered public accounting firm to report on the effectiveness of our internal control over financial reporting, as required by Section 404 of Sarbanes-Oxley. Our compliance with Section 404 of Sarbanes-Oxley will require that we incur substantial accounting expense and expend significant management efforts. The effectiveness of our controls and procedures may in the future be limited by a variety of factors, including:

faulty human judgment and simple errors, omissions or mistakes;

fraudulent action of an individual or collusion of two or more people;

inappropriate management override of procedures; and

the possibility that any enhancements to controls and procedures may still not be adequate to assure timely and accurate financial information.

If we are not able to comply with the requirements of Section 404 in a timely manner, or if we or our independent registered public accounting firm identifies deficiencies in our internal control over financial reporting that are deemed to be material weaknesses, we may be subject to Nasdaq delisting, investigations by the U.S. Securities and Exchange Commission (SEC) and civil or criminal sanctions.

Our ability to successfully implement our business plan and comply with Section 404 requires us to be able to prepare timely and accurate financial statements. We expect that we will need to continue to improve existing, and implement new operational, financial and accounting systems, procedures and controls to manage our business effectively.

Any delay in the implementation of, or disruption in the transition to, new or enhanced systems, procedures or controls may cause our operations to suffer, and we may be unable to conclude that our internal control over financial reporting is effective and to obtain an unqualified report on internal controls from our auditors as required under Section 404 of Sarbanes-Oxley. If we are unable to complete the required Section 404 assessment as to the adequacy of our internal control over financial reporting, if we fail to maintain or implement adequate controls, or if our independent registered public accounting firm is unable to provide us with an unqualified report as to the effectiveness of our internal control over financial reporting, our ability to obtain additional financing could be impaired. In addition, investors could lose confidence in the reliability of our internal control over financial reporting and in the accuracy of our periodic reports filed under the Securities Exchange Act of 1934, as amended (Exchange Act). A lack of investor confidence in the reliability and accuracy of our public reporting could cause our stock price to decline.

Risks Relating to an Investment in Our Common Stock

Our common stock could be subject to extreme volatility.

Our common stock is currently traded on the Nasdaq Global Market. The trading price of our common stock from time to time has fluctuated widely and may be subject to similar volatility in the future. For example, for the calendar year ended December 31, 2008, the 52-week high and low reported closing prices of our common stock were \$16.84 and \$2.66, respectively. The trading price of our common stock in the future may be affected by a number of factors, including events described in these Risk Factors. In recent years, broad stock market indices, in general, and smaller capitalization and PV companies, in particular, have experienced substantial price fluctuations. In a volatile market, we may experience wide fluctuations in the market price of our common stock. These fluctuations may have a negative effect on the market price of our common stock regardless of our operating performance. In the past, following periods of volatility in the market price of a company's securities, securities class action litigation has often been instituted. A securities class action suit against us could result in substantial costs, potential liabilities and the diversion of management's attention and resources, and could have a material adverse effect on our financial condition.

Table of Contents

Future sales or the potential for future sales of our securities may cause the trading price of our common stock to decline and could impair our ability to raise capital through subsequent equity offerings.

Sales of a substantial number of shares of our common stock or other securities in the public markets, or the perception that these sales may occur, could cause the market price of our common stock or other securities to decline and could materially impair our ability to raise capital through the sale of additional securities. A large number of our outstanding shares are not registered under the Securities Act of 1933, as amended (the "Securities Act"). If and when these shares are registered or become eligible for sale to the public market, the market price of our common stock could decline.

While any of our warrants are outstanding, it may be more difficult to raise additional equity capital.

There currently are warrants outstanding to purchase our securities. These warrants include Class B warrants and warrants issued to the representative of the underwriters in our initial public offering. During the term that any of our warrants are outstanding, the holders of those warrants are given the opportunity to profit from a rise in the market price of our common stock. The Class B warrants are not redeemable by us. We may find it more difficult to raise additional equity capital while these warrants are outstanding. At any time during which these warrants are likely to be exercised, we may be unable to obtain additional equity capital on more favorable terms from other sources.

Some provisions of our charter documents and Delaware law may have anti-takeover effects that could discourage an acquisition of us by others, even if an acquisition would be beneficial to our stockholders, and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our Certificate of Incorporation and Bylaws, as well as provisions of Delaware law, could make it more difficult for a third party to acquire us, or for a change in the composition of our Board of Directors (our "Board") or management to occur, even if doing so would benefit our stockholders. These provisions include:

authorizing the issuance of blank check preferred stock, the terms of which may be established and shares of which may be issued without stockholder approval;

dividing our Board into three classes;

limiting the removal of directors by the stockholders; and

limiting the ability of stockholders to call a special meeting of stockholders.

In addition, we are subject to Section 203 of the Delaware General Corporation Law, which generally prohibits a Delaware corporation from engaging in any of a broad range of business combinations with an interested stockholder for a period of three years following the date on which the stockholder became an interested stockholder, unless such transactions are approved by our Board. This provision could have the effect of delaying or preventing a change of control, whether or not it is desired by or beneficial to our stockholders. See "Description of Securities" Anti-Takeover Effects of Certain Provisions of Delaware Law and Our Certificate of Incorporation and Bylaws in the accompanying prospectus.

Norsk Hydro, our largest stockholder, is exempt from the general prohibitions of Section 203 because the transaction by which it became an interested stockholder in March 2007 was approved by our Board. Because Norsk Hydro now has two representatives on our Board, it is less likely that a third party could become an interested stockholder without the consent of Norsk Hydro.

Table of Contents

Forward-Looking Statements

This prospectus supplement includes forward-looking statements that involve risks and uncertainties. Forward-looking statements include statements concerning our plans, objectives, goals, strategies, future events, future net sales or performance, capital expenditures, financing needs, plans or intentions relating to acquisitions, business trends and other information that is not historical information and, in particular, appear under headings including Summary and Business. When used in this prospectus supplement, the words estimates, expects, anticipates, projects, plans, intends, believes, forecasts, foresees, likely, may, should, goal, target and variations of such words or similar are intended to identify forward-looking statements. All forward-looking statements are based upon information available to us on the date of this prospectus supplement.

These forward-looking statements are subject to risks, uncertainties and other factors, many of which are outside of our control, that could cause actual results to differ materially from the results discussed in the forward-looking statements, including, among other things, the matters discussed in this prospectus supplement in the section captioned Risk Factors. Factors you should consider that could cause these differences include, but are not limited to:

Our limited operating history and lack of profitability;

Our ability to meet the cost and performance metrics that we have forecasted;

Our ability to develop demand for, and sales of, our PV modules and establish strategic relationships with key partners, including OEMs, system integrators and distributors;

Our ability to obtain necessary or desired certifications for our PV modules;

Whether we receive timely delivery of production tools from our equipment suppliers;

Our ability to design, purchase, install, qualify and operate production tools pursuant to our business plan and within budgeted amounts;

The extent to which we are able to reduce the per watt manufacturing costs of our PV modules, and the extent to which our competitors are able to do the same with their PV modules;

Global demand for electricity and the market for renewable energy, including solar energy;

The cost-effectiveness of PV-generated energy relative not only to that generated from conventional sources such as fossil fuels, but also to that generated from other renewable sources such as wind, geothermal and tidal power;

The availability of, or changes to, government policies, regulations, subsidies and incentives that affect the use or cost of renewable energy;

The emergence of disruptive or competing technologies in the energy industry;

Edgar Filing: Ascent Solar Technologies, Inc. - Form 424B4

Our competitive position and that of our PV modules relative to others in the PV and thin-film markets, and our continued investment in research and development;

The extent to which our interests align with or deviate from that of Norsk Hydro, our largest stockholder;

Foreign currency exchange fluctuations, political instability in certain foreign markets or the general state of geopolitical affairs;

The supply and price of equipment, components and raw materials;

The status of our relationship with ITN;

Our ability to attract and retain key executives and employees;

S-21

Table of Contents

The extent to which we are able to manage the expansion of our operations effectively, both domestically and abroad;

Commencement of legal proceedings against us or by us, including proceedings relating to environmental matters or intellectual property rights;

Our ability to expand and protect the intellectual property portfolio that relates to our PV modules and processes;

Our compliance with applicable environmental laws and regulations;

The extent to which any of our revenue-generating contracts with the U.S. government are terminated or modified;

The extent to which we receive funds or qualify to perform research and development under the federal government's SBIR and other government-sponsored programs; and

General economic and business conditions.

There may be other factors that could cause our actual results to differ materially from the results referred to in the forward-looking statements. We undertake no obligation to publicly update or revise forward-looking statements to reflect subsequent events or circumstances after the date made or to reflect the occurrence of unanticipated events, except as required by law.

Table of Contents

Business

Overview

We are a development stage company formed in October 2005 to commercialize flexible PV modules using proprietary technology. Our technology was initially developed at ITN by our founder and core scientific team beginning in 1994 and subsequently assigned and licensed to us. Our proprietary manufacturing process deposits multiple layers of materials, including a thin film of highly efficient CIGS semiconductor material, on a flexible, lightweight, plastic substrate and then laser patterns the layers to create interconnected PV cells, or PV modules, in a process known as monolithic integration. We believe that our technology and manufacturing process provides us with significant advantages over both the c-Si based PV manufacturers that currently dominate the PV market, as well as other thin-film PV manufacturers that use rigid and/or heavier substrate materials such as glass, stainless steel or other metals.

Our thin-film PV modules require less than 1% of the semiconductor material currently needed to achieve the same power output as a c-Si-based PV device. Consequently, we do not face the supply constraints and raw material costs that may affect silicon-based PV manufacturers. Also, we believe that our use of CIGS on a flexible, durable, lightweight, high-tech plastic substrate should allow for integration of our PV modules into a variety of building materials, electronic products, military and space applications, as well as other products and applications that may emerge. We believe that the unique attributes of our materials will enable a reduction in the overall system cost, installation cost and logistical cost-per-watt ratios. For markets that place a high premium on weight, like space and near-space markets, our materials should provide attractive increases in the power-to-weight ratio, and we believe that our materials have higher power-to-area ratios and voltage-to-area ratios than do competing flexible PV thin-films. These metrics will be critical as we position ourselves to compete in commercial roof-top applications and high value-added markets like military, space and EIPV solar module applications. We believe that, when employed on a sufficiently large commercial scale, our large-format, roll-to-roll manufacturing process and proprietary monolithic integration techniques will allow us to achieve a per watt manufacturing cost lower than most of our flexible, lightweight, thin-film competitors. At sufficiently large commercial scale, we believe overall grid parity is possible *i.e.*, the point at which the system level cost of our PV-generated power is equal to that of retail power distributed from the electric utility grid in certain geographic markets within five years.

Commercialization and Manufacturing Expansion Plan

We intend to be the first company to manufacture large, roll-format, PV modules in commercial quantities that use CIGS on a flexible, plastic substrate. Our manufacturing expansion plan entails the design, installation, qualification, testing and operation of additional production tools to increase our rated production capacity. We began commercial production on our 1.5 MW production line in the first quarter of 2009. We intend to incrementally expand our aggregate rated production capacity to 30 MW by attaining the following milestones within the time frames indicated:

Fourth quarter of 2009: Complete internal testing for certification and begin product certification with products from our 1.5 MW production line, and begin qualification of production tools for the first 15 MW.

First half of 2010: Begin production and ramp up of the first half of initial 30 MW of annual rated production capacity, and complete installation of 30 MW tools.

Second half of 2010: Ramp up to full 30 MW of annual rated production capacity.

Although we currently plan to expand our production capacity in accordance with the timeline above and further plan to expand our production capacity to 110 MW or more, the actual timing and amount of production capacity that we install may significantly deviate from the above plan due to market conditions, availability of financing, timeliness of delivery of production tools, product performance and other factors described in this prospectus supplement, the accompany prospectus and the documents that they incorporate by reference.

Table of Contents

Rated production capacity refers to our expected level of annual production upon optimization of our production process and is based on assumed production yields and module efficiencies. The actual production levels that we are able to realize at any point during our planned expansion will depend on a variety of factors, including our ability to optimize our production process to achieve targeted production yields and module efficiencies.

Advantages of CIGS on a Flexible Plastic Substrate

Thin-film PV solutions differ based on the type of semiconductor material chosen to act as a sunlight absorbing layer, and also on the type of substrate on which the sunlight absorbing layer is affixed. We believe that we are the only company currently focused on commercial scale production of PV modules using CIGS on a flexible, plastic substrate. We utilize CIGS as a semiconductor material because, at the laboratory level, it has a higher demonstrated cell conversion efficiency than a-Si and CdTe. We also believe that CIGS offers other compelling advantages over both a-Si and CdTe, including:

CIGS versus a-Si: Although a-Si, like CIGS, can be deposited on a flexible substrate, its conversion efficiency, which already is generally much lower than that of CIGS, measurably degrades when it is exposed to ultraviolet light, including natural sunlight. To mitigate such degradation, manufacturers of a-Si solar cells are required to implement measures that add cost and complexity to their manufacturing processes.

CIGS versus CdTe: Although CdTe modules have achieved conversion efficiencies that are generally comparable to CIGS in production, we believe that CdTe has never been successfully applied to a flexible substrate on a commercial scale. We believe that the use of CdTe on a rigid, transparent substrate, such as glass, makes CdTe unsuitable for a number of the applications that we are targeting in the BIPV and other markets. We also believe that CIGS can achieve higher conversion efficiencies than CdTe.

Our choice of substrate material further differentiates us from other thin-film PV manufacturers. We believe that the use of a flexible, lightweight substrate which is easier to install provides clear advantages for commercial rooftops, higher value-added BIPV and other markets, where rigid substrates are unsuitable for many applications. We also believe that our use of a flexible, plastic substrate provides us significant cost advantages because it enables us to employ monolithic integration techniques that we believe are unavailable to manufacturers who use flexible, metal substrates. Accordingly, we are able to eliminate the need for costly back-end assembly of inter-cell connections. As the only company, to our knowledge, focused on the commercial production of PV modules using CIGS on a flexible, plastic substrate, we believe we have the opportunity both to penetrate the BIPV, aerospace, and other markets with a high quality, value-added product and also to compete in the commodity solar panel market as a low-cost producer.

Competitive Strengths

We believe we possess a number of competitive strengths that provide us with an advantage over our competitors.

We are an early mover in CIGS technology with a proprietary, flexible, lightweight, high efficiency PV thin film product that positions us to penetrate a wide range of attractive high value-added markets such as BIPV, military, space and other markets. By applying CIGS to a flexible, plastic substrate, we have developed a PV module that is efficient, lightweight and malleable, providing unique opportunities for integration into building material products (such as roofing membranes, shingles, siding and facades, metal and composite panels). Commercial rooftops alone are a major segment of the world solar market. The market for electronic components (such as electronic packages, casings, and accessories as well as military portable power systems and space and near space solar power application solutions) also may prove to be a significant premium market. Relative to our thin film competitors, we believe that our early mover advantage in thin film CIGS on plastic

Table of Contents

technology has placed us on an accelerated path to commercialization with a superior product offering for these strategic market segments.

We have the ability to manufacture PV modules for different markets and for customized applications without altering our production processes. Our ability to produce PV modules in customized shapes and sizes or in a variety of shapes and sizes simultaneously without interrupting our production flow provides us with flexibility in determining target markets and product applications, and allows us to respond quickly to changing market conditions. Many of our competitors are limited by their technology and/or their manufacturing processes to a more restricted set of product opportunities.

Our integrated, roll-to-roll manufacturing process and proprietary monolithic integration techniques provide us a cost advantage over our competitors. Historically, manufacturers have formed PV modules by manufacturing individual solar cells and then interconnecting them. Our large-format, roll-to-roll manufacturing process allows for integrated production. In addition, our proprietary monolithic integration techniques allow us to utilize laser patterning to create interconnects, thereby creating PV modules at the same time we create PV cells. In so doing, we are able to eliminate an entire back-end processing step, saving time as well as labor and manufacturing costs relative to our competitors.

Our strategic relationship with Norsk Hydro provides us with direct access to a potentially large customer base in the global BIPV market. Norsk Hydro is a major global supplier of aluminum-based building systems, and our relationship provides us with a strong, established development and marketing partner for accessing the BIPV market in an accelerated manner. Together with Norsk Hydro, we are in the process of developing a product line that would incorporate our PV modules into various Norsk Hydro products such as sun-shading systems, wall systems and facades.

Our proven research and development capabilities position us to continue the development of next-generation PV modules and technologies. Our ability to produce CIGS-based PV modules on a flexible plastic substrate is the result of a concerted research and development effort that began more than fourteen years ago. We continue to pursue research and development in an effort to drive efficiency improvements in our current PV modules and to work toward next-generation technologies and additional applications.

Markets and Marketing Strategy

Our target markets include the BIPV market, the EIPV market, the military and governmental portable power markets and the space and near-space markets.

In BIPV applications, solar modules are incorporated directly into building and construction materials. For BIPV we intend to be the supplier of choice by offering high-performance, lightweight, durable and flexible PV modules that can be integrated directly into building material products such as roofing membranes, roofing shingles, siding, facades, shading devices, parking structures, and metal and composite panels. We anticipate that when integrated with our solar modules, traditional building materials will produce electricity from the integrated PV modules. Commercial rooftop applications may become an important market for the Company's laminated solar products where we are cooperating with three important strategic partners.

In EIPV applications, solar modules are incorporated directly into portable electronic devices or the surface of their accessories. For EIPV, we intend to supply high voltages in small spaces for PV integration directly into electronic packages, casings, and accessories in the consumer electronics market.

Military and governmental portable power is an attractive market opportunity for us to provide lightweight power generating products like solar blankets and solar tents that can be field deployed for powering the military's increasing energy requirements. By displacing conventional fuels, the military can become more cost

Table of Contents

effective by utilizing our PV materials where there is no reliable operating electric grid. We intend to continue to develop the existing military portable power market by developing relationships with key strategic players currently serving this market as existing large military and governmental contractors. We envision the military market as a likely early market entry point for our lightweight portable power products because similar products have been in development and qualification testing for a number of years.

In space and near-space market applications, solar PV modules are incorporated into satellites, aircraft or high altitude air ships. In the space, near-space and military portable power markets, we believe that our power-producing modules are uniquely suited for applications requiring mobility, durability and light weight. In the space and near-space market, we intend to use our durable and lightweight technology to provide both higher value and more capable solutions at cost-effective system prices. We hope to develop customers in these markets based upon strategic relationships with large players in those application areas.

Our marketing and distribution strategy is based on the formation of strategic relationships with key partners, including OEMs, system integrators and distributors, who deal directly with installers, contractors or end-users in our target markets. Since 2007, we have entered into a number of strategic relationships with companies active in the BIPV and other markets; we are also in discussions with other market participants to establish similar relationships in a variety of geographic markets worldwide.

Until we commence commercial production at our new Thornton, Colorado production facility, which we currently expect will occur in the first half of 2010, we intend to supply our strategic partners with PV module samples produced on our 1.5 MW production line to support our partners' efforts to develop, test and certify new integrated flexible PV products. This should enable them to identify and cultivate promising market segments. By cooperating with our strategic partners in this way, we hope to create sufficient and consistent demand for our PV modules by the time we commence large scale commercial production of our PV modules using our planned production tools for approximately 30 MW of rated capacity. We also intend to initiate sales of PV modules to these partners from our 1.5 MW production line. We envision that we ultimately will serve as a provider of high value-added thin-film solar components to our strategic partners, who will be solely responsible for the marketing, sales and distribution of their integrated building and electronics products, as well as our key partners in the government, military, space and near-space application markets. In so doing, we intend to position ourselves as a leading manufacturer and supplier of value-added lightweight, durable, and flexible PV components to these markets. By capitalizing on the lightweight features of our thin-film PV products, we believe that we can reduce overall system installation and logistics costs, making our PV solutions more attractive to our strategic partners and their customers.

Although the BIPV, EIPV and military and governmental portable power markets comprise our immediate target markets, in the longer-term, we also intend to pursue opportunities in the space satellite and near-space markets. We expect the space satellite and the near-space markets to evolve more gradually than the terrestrial market principally due to the higher degree of product qualifications and flight testing that will be required. We anticipate that our pathway to the space and near-space markets will be through development of modules for experimental space qualification tests and then actual flight experiments with governmental customers, followed by full scale flight arrays on operational systems once the technology and arrays have been fully space qualified. We intend to pursue these opportunities because we believe that the space and near-space markets place a premium on performance and offer a correspondingly high-value opportunity for our technology.

Manufacturing and Manufacturing Strategy

We manufacture our products by affixing a thin CIGS layer to a flexible, plastic substrate, and by using proprietary monolithic integration techniques that enable us to form complete PV modules without engaging in costly back-end assembly of inter-cell connections. Historically, PV manufacturers made PV modules by bonding or soldering discrete PV cells together. This manufacturing step typically increased manufacturing costs and at times proved detrimental to the overall yield and reliability of the finished product. By eliminating this

Table of Contents

added step using our proprietary monolithic integration techniques, we believe that we can achieve cost savings in, and increase the reliability of, our PV modules. We also use a large-format, roll-to-roll manufacturing process that permits us to fabricate our flexible PV modules in an integrated sequential operation.

The following diagram is a general illustration of our manufacturing process:

While focused on speed to market, we believe that quality and consistency of product will be paramount to our success in the marketplace. Consequently, our path to commercialization is defined by a highly disciplined, staged progression. In keeping with this philosophy, we completed construction of our 1.5 MW production line in December 2007. During the first quarter of 2009, we began regular production of monolithically integrated flexible CIGS modules on that line. In June 2009, we announced that, using the 1.5 MW production line, we had manufactured a five-meter long, monolithically integrated, PV module on a flexible, plastic substrate that weighed 2 kilograms and produced 123 watts (under standard test conditions) with a 9.1% aperture efficiency. In July 2009, the National Renewable Energy Laboratory (NREL) independently verified that standard 429 cm² modules produced on our 1.5 MW production line yielded conversion efficiencies as high as 10.4%. Over time and with further refinement of our existing processes, we hope that our PV modules will achieve efficiencies of up to 12.0%.

The design of the production equipment to be installed in our 30 MW expansion is based on our existing 1.5 MW production line. Our production parameters are currently being developed as we increase throughput rates on the 1.5 MW production line; once proven, we expect that they will be implemented in the 30 MW expansion line. Economies of scale should be achieved by applying these increased throughput rates to multiple lines and through increased utilization of ancillary equipment.

We have taken delivery of a one-meter wide CIGS deposition system. Deployment of the one-meter wide configuration into commercial production will depend on the outcome of the development work and the timing of our expansion. However, we currently consider the one-meter web as a research and development project offering the potential for long-term cost reduction. Commercial expansion to 30 MW is currently planned with the existing one-third meter web used in the 1.5 MW production line.

Table of Contents

We intend to continue to optimize our manufacturing processes including throughput, efficiency and yield to improve product performance and reduce manufacturing costs. We also intend to identify and evaluate suitable locations for new production lines, domestically and abroad, that we believe will best serve our target markets and customers.

Competition

Today the market for PV products is dominated by large manufacturers of crystalline silicon technology. In 2008, the five largest of these manufacturers were: Q-cells (Germany), Suntech Power Holdings Co., Ltd. (China), Sharp (Japan), Kyocera (Japan), and Motech Industries (Taiwan). In all, there are over 25 manufacturers with annual cell production capacities in excess of 25 MW. We anticipate that while these leaders may continue to dominate the market with their silicon-based products for several years, thin-film manufacturers will begin to capture an increasingly larger share of the market.

The landscape of thin-film manufacturers encompasses a broad mix of technology platforms at various stages of development, and consists of a large and growing number of medium and small sized companies. Some of the established crystalline silicon manufacturers have also pursued thin film technologies, either in conjunction with their crystalline efforts, or more recently as a way to diversify their technology portfolios and insulate themselves from silicon supply shocks.

The two largest thin-film PV manufacturers are First Solar, Inc. and Energy Conversion Devices, Inc. First Solar manufactures PV modules by depositing CdTe onto rigid glass plates using monolithic integration techniques similar to ours. Relative to our lightweight, flexible plastic substrates, PV modules using glass substrates are rigid and heavy. First Solar therefore primarily serves the commodity module markets initially targeting large scale, grid-connected solar power projects. Energy Conversion Devices manufactures thin-film a-Si cells on flexible metal foil. These cells must be individually assembled in series and parallel to form an integrated module similar to how c-Si products are manufactured. The additional integration steps required to produce Energy Conversion Devices modules add significant weight and cost, and c-Si does not offer the same efficiency upside as CIGS. Both Energy Conversion Devices and First Solar are well-established market leaders having occupied top 20 solar manufacturing positions since 2006.

We believe that our modules offer unique advantages. Our modules have no glass and thus have potentially lower installed balance of systems costs. We use monolithic integration, which eliminates the expensive back-end process of wiring cells into modules. We believe that our features combine low cost and flexibility for monolithically integrated lightweight flexible modules suitable for many market sectors with particular application to rooftops.

Competitors currently developing or selling CIGS-based PV modules include AVANCIS GmbH & Co. KG, Global Solar Energy, Inc., HelioVolt Corporation, Honda Soltec Co. Ltd., MiaSolé, NanoSolar, Inc., Solibra GmbH, Solyndra Inc., SoloPower, Inc. and Würth Solar GmbH & Co. A number of manufacturers that traditionally have manufactured and sold c-Si-based modules have entered, or in the future may enter, the market for thin-film PV modules and, potentially, CIGS-based PV modules. These efforts have been initiated both through internal development and the acquisition of external companies.

Market conditions from 2004 until mid-2008 were ideal for new entrants looking to supply PV technology. The prevalence of capital and manufacturing subsidies led to a significant increase in the number of new companies pursuing crystalline and thin-film technologies. As market dynamics have almost completely reversed in conjunction with the current economic downturn, those companies that do not have a sufficiently differentiated product, particularly those offering low efficiency glass-based modules, may find themselves unable to compete with established players and unique technologies.

Table of Contents

Research and Development and Intellectual Property

Our core group of scientists has worked together since 1994 in the research and development of CIGS and related PV technologies. We intend to continue to invest in research and development in order to provide near-term improvements to our manufacturing process and products, as well as to identify next-generation technologies relevant to both our existing and potential new markets. Our near-term R&D is focused on simplifying the manufacturing process even further. With regard to our next-generation technologies, we are pursuing multi-junction CIGS designs that we believe, if successfully deployed, would significantly increase the conversion efficiencies of our existing PV modules. We also are engaged in limited research and development activities related to longer-term opportunities in the evolving space satellite and near-space markets. During 2008 and 2007, approximately 85% of our research and development activities related to optimizing our manufacturing process and the remaining 15% related to next generation technology including space and near-space research and development activities funded through our awarded government contracts. During 2008 and 2007, we incurred approximately \$10.1 million and \$4.8 million in research and development activities.

Our technology was initially developed at ITN by our founder and core scientific team beginning in 1994. In early 2006, ITN assigned to us certain CIGS PV-specific technologies, and granted to us a perpetual, exclusive, royalty-free, worldwide license to use, in connection with the manufacture, development, marketing and commercialization of CIGS PV to produce solar power, certain of ITN's existing and future proprietary process and control technologies that, although non-specific to CIGS PV, we believe will be useful in our production of PV modules for our target markets. ITN retained the right to conduct research and development activities in connection with PV materials, and we agreed to grant a license back to ITN of improvements to the licensed technologies and intellectual property that are outside of the CIGS PV field.

We protect our intellectual property through a combination of trade secrets and patent protections. We own the following patents and published patent applications:

1. Apparatus and method of production of thin film photovoltaic modules (US Patent No. 7,271,333) (issued September 18, 2007)
 2. Flexible High-Voltage Adaptable Current Photovoltaic Modules and Associated Methods (US 11/877,632) (filed October 23, 2007) (co-owned with PermaCity Corporation)
 3. Flexible Photovoltaic Array With Integrated Wiring And Control Circuitry, And Associated Methods (US 11/877,625) (filed October 23, 2007) (co-owned with PermaCity Corporation)
 4. Array of Monolithically Integrated Thin Film Photovoltaic Cells and Associated Methods (PCT/US08/67772; US 12/143,713) (filed June 20, 2008)
 5. Methods for Fabricating p-Type Cadmium Selenide (PCT/US08/70240) (filed July 16, 2008)
 6. Hybrid Multi-Junction Photovoltaic Cells and Associated Methods (PCT/US08/70239; US 12/174,626) (filed July 16, 2008)
- In addition, we have one unpublished provisional patent in a related area filed February 5, 2009.

In early April 2006, we entered into a non-exclusive patent license agreement with Midwest Research Institute (MRI). MRI manages and serves as operating contractor for NREL under a prime contract with the U.S. Department of Energy. Pursuant to the prime contract, MRI acquired the rights to license certain inventions developed at NREL. We have acquired a world-wide, non-exclusive, royalty-bearing, commercial license to the following U.S. patents and their foreign counterparts: U.S. Patent Nos. 5,356,839, 5,441,897 and 5,436,204; European Patent No. EP0694209 (validated Belgium, France, United Kingdom, Germany and Netherlands) and European patent application serial No. 95929367.1 (designated Belgium, France, United Kingdom, Germany and Netherlands); Japanese Patent Nos. 3130943 and 3258667 and Japanese patent application serial no. 8-508088. Products made under this license for use or sale in the United States must be substantially manufactured in the United States, and we are subject to specific development and commercialization requirements. The license is

Table of Contents

effective so long as any claim of the licensed inventions is enforceable, unless terminated earlier for cause as specified in the agreement. We also have obtained a non-exclusive, royalty-bearing license from the University of Delaware's Institute of Energy Conversion for U.S. Patent Nos. 6,310,281, 6,372,538, 6,537,845 and 6,562,405, as well as U.S. patent application serial No. 60/620,352. The agreement requires us to use commercially reasonable efforts to practice the licensed patents, and we agree not to assert any rights in our improvements to the licensed patents against the University of Delaware and its other licensees and their customers. These patents and patent applications relate to the fabrication of CIGS on flexible plastic substrates, the use of laser patterning and thin-film deposition during the fabrication of flexible monolithically-integrated CIGS PV devices and certain process steps that we may use during the manufacturing process.

Suppliers

We rely on several unaffiliated companies to supply certain raw materials used during the fabrication of our PV modules. We acquire these materials on a purchase order basis and do not have long-term contracts with the suppliers, although we may enter into such contracts in the future. We currently acquire all of our high-temperature plastic from Ube Industries, Ltd. (Japan), although alternative suppliers of similar materials exist. We purchase component molybdenum, copper, indium, gallium, selenium and indium tin oxides from a variety of suppliers. We also currently are in the process of identifying and negotiating arrangements with alternative suppliers of materials in the United States and Asia. We also have announced our intent to explore a strategic relationship with ITOCHU Corporation (ITOCHU) whereby, among other things, ITOCHU would help us source raw materials for our operations. The manufacturing equipment and tools used in our production process have been purchased from various suppliers in Europe, the United States and Asia. Although we have had good relations with our existing equipment and tools suppliers, we intend to monitor and explore opportunities for developing alternative sources.

Employees

As of September 23, 2009, we had 84 employees, of which 9 were executive officers and 2 were part-time. We expect the number of employees to grow significantly as we install additional equipment and increase manufacturing capacity.

Company History

We were formed in October 2005 from the separation by ITN of its Advanced Photovoltaic Division and all of that division's key personnel and core technologies. ITN, a private company incorporated in 1994, is an incubator dedicated to the development of thin-film, PV, battery, fuel cell and nano technologies. Through its work on research and development contracts for private and government entities, ITN developed proprietary processing and manufacturing know-how applicable to PV products generally, and to CIGS PV products in particular. ITN formed us to commercialize its investment in CIGS PV technologies. In January 2006, ITN assigned to us certain CIGS PV-specific technologies, and granted to us a perpetual, exclusive, royalty-free worldwide license to use, in connection with the manufacture, development, marketing and commercialization of CIGS PV to produce solar power, certain of ITN's existing and future proprietary process and control technologies in the production of CIGS PV modules. Upon receipt of the necessary government approvals in January 2007, ITN assigned government-funded research and development contracts to us and also transferred the key personnel working on the contracts to us. Today, ITN still provides to us a variety of administrative and technical services such as facilities management, equipment maintenance, procurement, information technology and technical support services. ITN is wholly owned by Inica, Inc. (Inica). Dr. Mohan Misra, Chairman of our Board of Directors and our Chief Strategy Officer, and an immediate family member own all of the outstanding shares of Inica.

Corporate Information

We are incorporated under the laws of Delaware, our principal business office is located at 12300 Grant Street, Thornton, Colorado, and our telephone number is (720) 872-5000. Our website address is www.ascentsolar.com. Information contained on our website or any other website does not constitute part of this prospectus supplement.

Table of Contents**Use of Proceeds**

Based upon an assumed offering price of \$7.85 per share, the last reported sale price of our common stock on September 29, 2009, we estimate that the net proceeds we will receive from this offering and the Concurrent Private Placement will be approximately \$34,212,500, after deducting underwriting discounts and commissions and estimated expenses payable by us. We intend to use the net proceeds from this offering for expansion of our rated production and capacity and for general corporate purposes.

Price Range of Common Stock

Our common stock has been listed on the Nasdaq Global Market under the symbol `ASTI` since November 13, 2007, and on the Nasdaq Capital Market from August 10, 2006 until November 13, 2007. Prior to August 10, 2006, there was no public market for our common stock. The following table sets forth the range of high and low sales prices per share as reported on Nasdaq for the periods indicated.

	High	Low
Year ending December 31, 2009		
Third Quarter (through September 29, 2009)	\$ 8.58	\$ 5.10
Second Quarter	8.83	3.80
First Quarter	4.64	2.19
Year ending December 31, 2008		
Fourth Quarter	6.80	2.57
Third Quarter	10.31	5.65
Second Quarter	18.39	10.10
First Quarter	27.95	8.02
Year ending December 31, 2007		
Fourth Quarter	28.35	13.17
Third Quarter	19.75	6.50
Second Quarter	11.34	6.99
First Quarter	10.44	2.41

Dividend Policy

We have never paid, and it is our present intention for the foreseeable future not to pay, dividends on our common stock. The declaration and payment of dividends is subject to the discretion of our Board of Directors (our `Board`) and depends on various factors, including our net income, financial conditions, cash requirements, future prospects, contractual restrictions and other factors deemed relevant by our Board.

Table of Contents

Capitalization

The following table sets forth our:

Actual capitalization as of June 30, 2009; and

As adjusted capitalization as of June 30, 2009, after giving effect to our sale of 4,000,000 shares of common stock in this offering and 636,943 shares of common stock in the Concurrent Private Placement at an assumed offering price of \$7.85, and after deducting underwriting discounts and commissions and offering expenses payable by us.

	June 30, 2009	
	Actual	Pro Forma as Adjusted
DEBT	\$ 7,433,247	\$ 7,433,247
STOCKHOLDERS EQUITY		
Preferred stock, \$0.0001 par value: 25,000,000 shares actual authorized: no shares issued and outstanding	\$	\$
Common stock, \$0.0001 par value: 75,000,000 shares actual authorized: 21,080,511 shares issued and outstanding June 30, 2009 actual; 25,717,454 shares issued and outstanding pro forma as adjusted	2,108	2,572
Additional paid-in capital	165,614,716	199,826,755
Deficit accumulated during development stage	(34,049,358)	(34,049,358)
Accumulated other comprehensive income	410,233	410,233
Total capitalization	\$ 139,410,946	\$ 173,623,449

You should read this table in conjunction with other sections of this prospectus supplement, the accompanying prospectus and any documents that they incorporate by reference.

A \$1.00 increase or decrease in the assumed offering price of \$7.85

per share would affect our additional paid-in capital and total capitalization as follows, assuming that the number of shares offered by us, as shown on the cover of this prospectus supplement, remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us:

	If a \$1.00 increase:	If a \$1.00 decrease:
Additional paid-in capital	\$ 204,213,698	\$ 195,439,812
Total Capitalization	\$ 178,010,392	\$ 169,236,506

Table of Contents**Dilution**

If you invest in our common stock in this offering, your ownership interest will be diluted to the extent of the difference between the public offering price per share of our common stock and the as adjusted net tangible book value per share of our common stock upon completion of this offering and the Concurrent Private Placement. Historical net tangible book value per share is determined by dividing our total tangible assets (total assets less intangible assets) less total liabilities, by the number of outstanding shares of our common stock. The historical net tangible book value of our common stock as of June 30, 2009 was approximately \$131.8 million, or approximately \$6.25 per share of common stock, based on the number of shares of common stock outstanding as of June 30, 2009.

Investors participating in this offering will incur immediate and substantial dilution. After giving effect to the sale of common stock offered by us in this offering and the Concurrent Private Placement at the assumed public offering price of \$7.85 per share, and after deducting the underwriting discounts and commissions and estimated expenses payable by us, our as adjusted net tangible book value as of June 30, 2009 would have been approximately \$166 million, or approximately \$6.45 per share of common stock. This represents an immediate increase in as adjusted net tangible book value of \$0.20 per share to existing common stockholders, and an immediate dilution of \$1.40 per share to investors participating in this offering. The following table illustrates this per share dilution:

Public offering price per share ⁽¹⁾	\$ 7.85
Historical net tangible book value per share as of June 30, 2009	6.25
Increase in historical net tangible book value per share attributable to investors participating in this offering	0.20
As adjusted historical net tangible book value per share after this offering	6.45
Dilution per share to investors participating in this offering	\$ 1.40

⁽¹⁾ Based upon the last reported sale price of our common stock on September 29, 2009.

If the underwriters also exercise their option in full to purchase 600,000 additional shares of common stock in this offering, our as adjusted net tangible book value per share as of June 30, 2009 would have been \$6.48 per share, the increase in our net tangible book value per share to existing stockholders would be \$0.23 per share, and the dilution to new investors participating in this offering would be \$1.37 per share.

Table of Contents

Certain U.S. Federal Income Tax Consequences

to Non-U.S. Holders of Common Stock

The following is a summary of certain U.S. federal income tax consequences of the purchase, ownership, and disposition of common stock by a non-U.S. holder (as defined below) that acquires our common stock in this offering and holds it as a capital asset. This discussion is based upon the Internal Revenue Code of 1986, as amended, which we refer to as the Code, U.S. Treasury regulations, and judicial decisions and administrative interpretations thereof, all as of the date hereof and all of which are subject to change, possibly with retroactive effect. The foregoing are subject to differing interpretations which could affect the tax consequences described herein. This discussion does not address all aspects of U.S. federal income taxation that may be applicable to investors in light of their particular circumstances, or to investors subject to special treatment under U.S. federal income tax laws, such as financial institutions, insurance companies, tax-exempt organizations, entities that are treated as partnerships for U.S. federal income tax purposes, dealers in securities or currencies, controlled foreign corporations, passive foreign investment companies, expatriates, persons deemed to sell common stock under the constructive sale provisions of the Code, and persons that hold common stock as part of a straddle, hedge, conversion transaction, or other integrated investment. Furthermore, this discussion does not address any U.S. federal gift tax laws or any state, local or foreign tax laws.

You are urged to consult your tax advisors regarding the U.S. federal, state, local and foreign income and other tax consequences of the purchase, ownership, and disposition of our common stock.

For purposes of this summary, you are a non-U.S. holder if you are a beneficial owner of common stock that, for U.S. federal income tax purposes, is not:

an individual that is a citizen or resident of the United States;

a corporation, other entity treated as a corporation for U.S. federal income tax purposes, or partnership that is created or organized under the laws of the United States, any state thereof, or the District of Columbia;

an estate the income of which is subject to U.S. federal income taxation regardless of its source; or

a trust, provided that, (1) a court within the United States is able to exercise primary supervision over its administration or one or more United States persons (as defined in the Code) have the authority to control all substantial decisions of that trust, or (2) the trust has made an election under the applicable Treasury regulations to be treated as a United States person.

If a partnership (including any entity or arrangement treated as a partnership for U.S. federal income tax purposes) owns our common stock, the U.S. federal income tax treatment of a partner in the partnership generally will depend upon the status of the partner and the activities of the partnership. Partners in a partnership that owns our common stock should consult their tax advisors as to the particular U.S. federal income tax consequences applicable to them.

THIS SUMMARY IS FOR GENERAL INFORMATION ONLY AND IS NOT INTENDED TO CONSTITUTE A COMPLETE DESCRIPTION OF ALL TAX CONSEQUENCES FOR NON-U.S. HOLDERS RELATING TO THE OWNERSHIP AND DISPOSITION OF OUR COMMON STOCK. PROSPECTIVE HOLDERS OF OUR COMMON STOCK SHOULD CONSULT WITH THEIR TAX ADVISORS REGARDING THE TAX CONSEQUENCES TO THEM (INCLUDING THE APPLICATION AND EFFECT OF ANY STATE, LOCAL, NON-U.S. INCOME AND OTHER TAX LAWS) OF THE OWNERSHIP AND DISPOSITION OF OUR COMMON STOCK.

Distributions

In general, any distributions we make to a non-U.S. holder with respect to its share of our common stock will constitute a dividend for U.S. federal income tax purposes to the extent of our current or accumulated earnings and profits as determined for U.S. federal income tax purposes. Any distribution not constituting a dividend will be treated first as reducing the adjusted basis in the non-U.S. holder's shares of our common stock and, to the extent it exceeds the adjusted basis in the non-U.S. holder's shares of our common stock, as gain from the sale or exchange of

such stock.

S-34

Table of Contents

Except as described below, if you are a non-U.S. holder of common stock, distributions made to you out of our current or accumulated earnings and profits (as determined for U.S. federal income tax purposes) are subject to withholding of U.S. federal income tax at a 30% rate or at a lower rate if you are eligible for a lower treaty rate, and we and other payors will generally be required to withhold at a 30% rate (rather than the lower treaty rate), unless you have furnished to us or another payor:

a valid Internal Revenue Service Form W-8BEN or an acceptable substitute form upon which you certify, under penalties of perjury, your status as (or, in the case of a United States alien holder that is a partnership or an estate or trust, such forms certifying the status of each partner in the partnership or beneficiary of the estate or trust as) a non-United States person and your entitlement to the lower treaty rate with respect to such payments; or

in the case of payments made outside the United States to an offshore account (generally, an account maintained by you at an office or branch of a bank or other financial institution at any location outside the United States), other documentary evidence establishing your entitlement to the lower treaty rate in accordance with U.S. Treasury regulations.

Special certification and other requirements apply to certain non-U.S. holders that are pass-through entities rather than corporations or individuals.

If you are eligible for a reduced rate of United States withholding tax under a tax treaty, you may obtain refund of any amounts withheld in excess of that rate by filing a refund claim with the United States Internal Revenue Service.

If dividends paid to you are effectively connected with your conduct of a trade or business within the United States, and you have not claimed that the dividends are eligible for any treaty benefits as income that is not attributable to a permanent establishment that you maintain in the United States, we and other payors generally are not required to withhold tax from the dividends, provided that you have furnished to us or another payor a valid Internal Revenue Service Form W-8ECI or an acceptable substitute form upon which you certify, under penalties of perjury, that you are a non-United States person, and the dividends are effectively connected with your conduct of a trade or business within the United States and are includible in your gross income. Effectively connected dividends are taxed at rates applicable to United States citizens, resident aliens, and domestic United States corporations on a net income basis. If you are a corporate non-U.S. holder, effectively connected dividends that you receive may also, under certain circumstances, be subject to an additional branch profits tax at a 30% rate or at a lower rate if you are eligible for the benefits of an income tax treaty that provides for a lower rate.

Disposition of Common Stock

If you are a non-U.S. holder, you generally will not be subject to U.S. federal income tax on gain from U.S. sources that you recognize on a disposition of our common stock unless:

the gain is effectively connected with your conduct of a trade or business in the United States, and the gain is attributable to a permanent establishment that you maintain in the United States, if that is required by an applicable income tax treaty as a condition for subjecting you to United States taxation on a net income basis;

you are an individual, you hold our common stock as a capital asset, and you are present in the United States for 183 or more days in the taxable year of the disposition;

or we are or have been a United States real property holding corporation for U.S. federal income tax purposes.

Effectively connected gains are taxed at rates applicable to United States citizens, resident aliens, and domestic United States corporations on a net income tax basis. If you are a corporate non-U.S. holder, effectively connected gains that you recognize may also, under certain circumstances, be subject to an additional branch profits tax at a 30% rate or at a lower rate if you are eligible for the benefits of an income tax

Table of Contents

treaty that provides for a lower rate. An individual non-U.S. holder described in the second bullet point above will only be subject to U.S. federal income tax on the gain from the sale of our common stock to the extent such gain is deemed to be from U.S. sources, which will generally only be the case where the individual's tax home is in the United States. An individual's tax home is generally considered to be located at the individual's regular or principal (if more than one regular) place of business. If the individual has no regular or principal place of business because of the nature of the business, or because the individual is not engaged in carrying on any trade or business, then the individual's tax home is his regular place of abode. If an individual non-U.S. holder is described in the second bullet point above, and the individual non-U.S. holder's tax home is in the United States, then the non-U.S. holder may be subject to a flat 30% tax on the gain derived from the disposition, which gain may be offset by U.S. source capital losses.

We believe we currently are not, and we do not anticipate becoming, a United States real property holding corporation for U.S. federal income tax purposes.

Federal Estate Taxes

Common stock held by a non-U.S. holder at the time of death generally will be included in the holder's gross estate for United States federal estate tax purposes, unless an applicable estate tax treaty provides otherwise.

Information Reporting and Backup Withholding

We must report annually to the Internal Revenue Service and to each non-U.S. holder the amount of dividends paid to such holder and the tax withheld with respect to such dividends, regardless of whether withholding was required. Copies of the information returns reporting such dividends and withholding may also be made available to the tax authorities in the country in which the non-U.S. holder resides under the provisions of an applicable income tax treaty.

A non-U.S. holder will be subject to backup withholding for dividends paid to such holder unless such holder certifies under penalty of perjury that it is a non-U.S. holder (and the payor does not have actual knowledge or reason to know that such holder is a United States person as defined under the Code), or such holder otherwise establishes an exemption.

Information reporting and, depending on the circumstances, backup withholding will apply to the proceeds of a sale of our common stock within the United States or conducted through certain United States-related financial intermediate, unless the beneficial owner certifies under penalties of perjury that it is a non-U.S. holder (and the payor does not have actual knowledge or reason to know that the beneficial owner is a United States person as defined under the Code), or such owner otherwise establishes an exemption.

Any amounts withheld under the backup withholding rules may be allowed as a refund or a credit against a non-U.S. holder's U.S. federal income tax liability provided the required information is furnished to the Internal Revenue Service.

Concurrent Sale of Restricted Shares to Norsk Hydro

Pursuant to a Securities Purchase Agreement dated as of September 29, 2009 between Norsk Hydro and us, we have agreed to sell to Norsk Hydro restricted shares of our common stock for \$5.0 million. The restricted shares will be sold to Norsk Hydro contemporaneously with the closing of this offering at a per share price equal to the public offering price on the cover page of this prospectus supplement. In connection with its purchase of these shares, Norsk Hydro will receive piggyback registration rights that enable them to require us to register for resale the shares held by them if we engage in a registered public offering and demand registration rights with regard to the shares. Immediately after this offering and the Concurrent Private Placement, and assuming a public offering price of \$7.85, the last reported sale price of our common stock on September 29, 2009, Norsk Hydro will own 7,935,103 shares, or approximately 30.8% of our outstanding common stock.

Table of Contents

Underwriting

Barclays Capital Inc. is acting as the representative of the underwriters and the sole book-running manager of this offering. Under the terms of an underwriting agreement, which we will file as an exhibit to a current report on Form 8-K and incorporate by reference in this prospectus supplement, each of the underwriters named below has severally agreed to purchase from us the respective number of shares of common stock shown opposite its name below:

Underwriters	Number of Shares
Barclays Capital Inc.	
Cowen and Company, LLC	
Raymond James & Associates, Inc.	
Total	4,000,000

The underwriting agreement provides that the underwriters' obligation to purchase shares of common stock depends on the satisfaction of the conditions contained in the underwriting agreement including:

the obligation to purchase all of the shares of common stock offered hereby (other than those share of common stock covered by their option to purchase additional shares as described below), if any of the shares are purchased;

the representations and warranties made by us to the underwriters are true;

there is no material change in our business or in the financial markets; and

we deliver customary closing documents to the underwriters.

Commissions and Expenses

The following table summarizes the underwriting discounts and commissions we will pay to the underwriters. These amounts are shown assuming both no exercise and full exercise of the underwriters' option to purchase additional shares. The underwriting fee is the difference between the initial price to the public and the amount the underwriters pay to us for the shares.

	No Exercise	Full Exercise
Per share		
Total		

The representative of the underwriters has advised us that the underwriters propose to offer the shares of common stock directly to the public at the public offering price on the cover of this prospectus supplement and to selected dealers, which may include the underwriters, at such offering price less a selling concession not in excess of \$ _____ per share. After the offering, the representative may change the offering price and other selling terms. Sales of shares made outside of the United States may be made by affiliates of the underwriters.

The expenses of the offering that are payable by us are estimated to be \$225,000 (excluding underwriting discounts and commissions).

Option to Purchase Additional Shares

Edgar Filing: Ascent Solar Technologies, Inc. - Form 424B4

We have granted the underwriters an option exercisable for 30 days after the date of this prospectus supplement, to purchase, from time to time, in whole or in part, up to an aggregate of 600,000 shares at the public offering price less underwriting discounts and commissions. This option may be exercised if the underwriters sell more than 4,000,000 shares in connection with this offering. To the extent that this option is exercised, each underwriter will be obligated, subject to certain conditions, to purchase its pro rata portion of these additional shares based on the underwriter's percentage underwriting commitment in the offering as indicated in the table at the beginning of this Underwriting section.

S-37

Table of Contents

Lock-Up Agreements

Subject to certain exceptions, we, all of our directors, executive officers and holders of more than 5% of our outstanding stock have agreed that, without the prior written consent of Barclays Capital Inc., we and they will not directly or indirectly (1) offer for sale, sell, pledge, or otherwise dispose of (or enter into any transaction or device that is designed to, or could be expected to, result in the disposition by any person at any time in the future of) any shares of common stock (including, without limitation, shares of common stock that may be deemed to be beneficially owned by us or them in accordance with the rules and regulations of the Securities and Exchange Commission and shares of common stock that may be issued upon exercise of any options or warrants) or securities convertible into or exercisable or exchangeable for common stock, (2) enter into any swap or other derivatives transaction that transfers to another, in whole or in part, any of the economic consequences of ownership of the common stock, (3) make any demand for or exercise any right or file or cause to be filed a registration statement, including any amendments thereto, with respect to the registration of any shares of common stock or securities convertible, exercisable or exchangeable into common stock or any of our other securities, or (4) publicly disclose the intention to do any of the foregoing for a period of 90 days after the date of this prospectus supplement.

The 90-day restricted period described in the preceding paragraph will be extended if:

during the last 17 days of the 90-day restricted period we issue an earnings release or material news or a material event relating to us occurs; or

prior to the expiration of the 90-day restricted period, we announce that we will release earnings results during the 16-day period beginning on the last day of the 90-day period; in which case the restrictions described in the preceding paragraph will continue to apply until the expiration of the 18-day period beginning on the issuance of the earnings release or the announcement of the material news or occurrence of material event, unless such extension is waived in writing by Barclays Capital.

Barclays Capital Inc., in its sole discretion, may release the common stock and other securities subject to the lock-up agreements described above in whole or in part at any time with or without notice. When determining whether or not to release common stock and other securities from lock-up agreements, Barclays Capital Inc. will consider, among other factors, the holder's reasons for requesting the release, the number of shares of common stock and other securities for which the release is being requested and market conditions at the time.

Indemnification

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act, and to contribute to payments that the underwriters may be required to make for these liabilities.

Stabilization, Short Positions and Penalty Bids

The representative may engage in stabilizing transactions, short sales and purchases to cover positions created by short sales, and penalty bids or purchases for the purpose of pegging, fixing or maintaining the price of the common stock, in accordance with Regulation M under the Securities Exchange Act of 1934:

Stabilizing transactions permit bids to purchase the underlying security so long as the stabilizing bids do not exceed a specified maximum.

A short position involves a sale by the underwriters of shares in excess of the number of shares the underwriters are obligated to purchase in the offering, which creates the syndicate short position. This short position may be either a covered short position or a naked short position. In a covered short position, the number of shares involved in the sales made by the underwriters in excess of the number of shares they are obligated to purchase is not greater than the number of shares that they may purchase by exercising their option to purchase additional shares. In a naked short position, the number of shares involved is greater than the number of shares in their option to purchase additional shares. The underwriters may close out any short position by either exercising their option to purchase additional shares and/or purchasing shares in the open market. In determining the source of shares to close out the

Table of Contents

short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared to the price at which they may purchase shares through their option to purchase additional shares. A naked short position is more likely to be created if the underwriters are concerned that there could be downward pressure on the price of the shares in the open market after pricing that could adversely affect investors who purchase in the offering.

Syndicate covering transactions involve purchases of the common stock in the open market after the distribution has been completed in order to cover syndicate short positions.

Penalty bids permit the representative to reclaim a selling concession from a syndicate member when the common stock originally sold by the syndicate member is purchased in a stabilizing or syndicate covering transaction to cover syndicate short positions. These stabilizing transactions, syndicate covering transactions and penalty bids may have the effect of raising or maintaining the market price of our common stock or preventing or retarding a decline in the market price of the common stock. As a result, the price of the common stock may be higher than the price that might otherwise exist in the open market. These transactions may be effected on the Nasdaq Global Market or otherwise and, if commenced, may be discontinued at any time.

Neither we nor any of the underwriters make any representation or prediction as to the direction or magnitude of any effect that the transactions described above may have on the price of the common stock. In addition, neither we nor any of the underwriters represent that the representative will engage in these stabilizing transactions or that any transaction, once commenced, will not be discontinued without notice.

Passive Market Making

In connection with the offering, underwriters and selling group members may engage in passive market making transactions in the common stock on the Nasdaq Global Market in accordance with Rule 103 of Regulation M under the Securities Exchange Act of 1934 during the period before the commencement of offers or sales of common stock and extending through the completion of distribution. A passive market maker must display its bids at a price not in excess of the highest independent bid of the security. However, if all independent bids are lowered below the passive market maker's bid, that bid must be lowered when specified purchase limits are exceeded.

Electronic Distribution

A prospectus supplement and the accompanying prospectus in electronic format may be made available on the Internet sites or through other online services maintained by one or more of the underwriters and/or selling group members participating in this offering, or by their affiliates. In those cases, prospective investors may view offering terms online and, depending upon the particular underwriter or selling group member, prospective investors may be allowed to place orders online. The underwriters may agree with us to allocate a specific number of shares for sale to online brokerage account holders. Any such allocation for online distributions will be made by the representative on the same basis as other allocations.

Other than the prospectus supplement and the accompanying prospectus in electronic format, the information on any underwriter's or selling group member's web site and any information contained in any other web site maintained by an underwriter or selling group member is not part of the prospectus supplement, and the accompanying prospectus or the registration statement of which this prospectus supplement and the accompanying prospectus forms a part, has not been approved and/or endorsed by us or any underwriter or selling group member in its capacity as underwriter or selling group member and should not be relied upon by investors.

Stamp Taxes

If you purchase shares of common stock offered in this prospectus supplement and the accompanying prospectus, you may be required to pay stamp taxes and other charges under the laws and practices of the country of purchase, in addition to the offering price listed on the cover page of this prospectus supplement and the accompanying prospectus.

Table of Contents

Relationships

Barclays Capital Inc., Cowen and Company, LLC and Raymond James, Inc. and/or any of their affiliates may in the future perform investment bank and advisory services for us from time to time for which they expect to receive customary fees and expense reimbursements.

Sales in Other Jurisdictions

Selling Restrictions

European Economic Area

In relation to each member state of the European Economic Area that has implemented the Prospectus Directive (each, a relevant member state), with effect from and including the date on which the Prospectus Directive is implemented in that relevant member state (the relevant implementation date), an offer of securities described in this prospectus supplement may not be made to the public in that relevant member state other than:

to any legal entity that is authorized or regulated to operate in the financial markets or, if not so authorized or regulated, whose corporate purpose is solely to invest in securities;

to any legal entity that has two or more of (1) an average of at least 250 employees during the last financial year; (2) a total balance sheet of more than 43,000,000 and (3) an annual net turnover of more than 50,000,000, as shown in its last annual or consolidated accounts;

to fewer than 100 natural or legal persons (other than qualified investors as defined in the Prospectus Directive) subject to obtaining the prior consent of the representative; or

in any other circumstances that do not require the publication of a prospectus pursuant to Article 3 of the Prospectus Directive, provided that no such offer of securities shall require us or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Directive.

For purposes of this provision, the expression an offer of securities to the public in any relevant member state means the communication in any form and by any means of sufficient information on the terms of the offer and the securities to be offered so as to enable an investor to decide to purchase or subscribe the securities, as the expression may be varied in that member state by any measure implementing the Prospectus Directive in that member state, and the expression Prospectus Directive means Directive 2003/71/EC and includes any relevant implementing measure in each relevant member state.

We have not authorized and do not authorize the making of any offer of securities through any financial intermediary on their behalf, other than offers made by the underwriters with a view to the final placement of the securities as contemplated in this prospectus supplement. Accordingly, no purchaser of the securities, other than the underwriters, is authorized to make any further offer of the securities on behalf of us or the underwriters.

United Kingdom

This prospectus supplement is only being distributed to, and is only directed at, persons in the United Kingdom that are qualified investors within the meaning of Article 2(1)(e) of the Prospectus Directive (Qualified Investors) that are also (i) investment professionals falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the Order) or (ii) high net worth entities, and other persons to whom it may lawfully be communicated, falling within Article 49(2)(a) to (d) of the Order (all such persons together being referred to as relevant persons). This prospectus supplement and its contents are confidential and should not be distributed, published or reproduced (in whole or in part) or disclosed by recipients to any other persons in the United Kingdom. Any person in the United Kingdom that is not a relevant persons should not act or rely on this document or any of its contents.

Table of Contents

Australia

No prospectus supplement or other disclosure document (as defined in the Corporations Act 2001 (Cth) of Australia ("Corporations Act")) in relation to the securities has been or will be lodged with the Australian Securities & Investments Commission ("ASIC"). This document has not been lodged with ASIC and is only directed to certain categories of exempt persons. Accordingly, if you receive this document in Australia:

(a) you confirm and warrant that you are either:

(i) a sophisticated investor under section 708(8)(a) or (b) of the Corporations Act;

(ii) a sophisticated investor under section 708(8)(c) or (d) of the Corporations Act and that you have provided an accountant's certificate to us which complies with the requirements of section 708(8)(c)(i) or (ii) of the Corporations Act and related regulations before the offer has been made;

(iii) a person associated with the company under section 708(12) of the Corporations Act; or

(iv) a professional investor within the meaning of section 708(11)(a) or (b) of the Corporations Act, and to the extent that you are unable to confirm or warrant that you are an exempt sophisticated investor, associated person or professional investor under the Corporations Act any offer made to you under this document is void and incapable of acceptance; and

(b) you warrant and agree that you will not offer any of the securities for resale in Australia within 12 months of those securities being issued unless any such resale offer is exempt from the requirement to issue a disclosure document under section 708 of the Corporations Act.

Hong Kong

The shares may not be offered or sold in Hong Kong, by means of any document, other than (a) to professional investors as defined in the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) and any rules made under that Ordinance or (b) in other circumstances which do not result in the document being a prospectus as defined in the Companies Ordinance (Cap. 32, Laws of Hong Kong) or which do not constitute an offer to the public within the meaning of that Ordinance. No advertisement, invitation or document relating to the securities may be issued or may be in the possession of any person for the purpose of the issue, whether in Hong Kong or elsewhere, which is directed at, or the contents of which are likely to be read by, the public in Hong Kong (except if permitted to do so under the laws of Hong Kong) other than with respect to the shares which are intended to be disposed of only to persons outside Hong Kong or only to professional investors as defined in the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) or any rules made under that Ordinance.

India

This prospectus supplement has not been and will not be registered as a prospectus with the Registrar of Companies in India or with the Securities and Exchange Board of India. This prospectus supplement or any other material relating to these securities is for information purposes only and may not be circulated or distributed, directly or indirectly, to the public or any members of the public in India and in any event to not more than 50 persons in India. Further, persons into whose possession this prospectus supplement comes are required to inform themselves about and to observe any such restrictions. Each prospective investor is advised to consult its advisors about the particular consequences to it of an investment in these securities. Each prospective investor is also advised that any investment in these securities by it is subject to the regulations prescribed by the Reserve Bank of India and the Foreign Exchange Management Act and any regulations framed thereunder.

Japan

No securities registration statement ("SRS") has been filed under Article 4, Paragraph 1 of the Financial Instruments and Exchange Law of Japan (Law No. 25 of 1948, as amended) ("FIEL") in relation to the shares. The shares are being offered in a private placement to qualified institutional investors (*tekikaku-kan-toshika*)

Table of Contents

under Article 10 of the Cabinet Office Ordinance concerning Definitions provided in Article 2 of the FIEL (the Ministry of Finance Ordinance No. 14, as amended) (QIIs), under Article 2, Paragraph 3, Item 2 i of the FIEL. Any QII acquiring the shares in this offer may not transfer or resell those shares except to other QIIs.

Korea

The shares may not be offered, sold and delivered directly or indirectly, or offered or sold to any person for reoffering or resale, directly or indirectly, in Korea or to any resident of Korea except pursuant to the applicable laws and regulations of Korea, including the Korea Securities and Exchange Act and the Foreign Exchange Transaction Law and the decrees and regulations thereunder. The shares have not been registered with the Financial Services Commission of Korea for public offering in Korea. Furthermore, the shares may not be resold to Korean residents unless the purchaser of the shares complies with all applicable regulatory requirements (including but not limited to government approval requirements under the Foreign Exchange Transaction Law and its subordinate decrees and regulations) in connection with the purchase of the shares.

Singapore

This prospectus supplement has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus supplement and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of the shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (i) to an institutional investor under Section 274 of the Securities and Future Act, Chapter 289 of Singapore (the SFA), (ii) to a relevant person as defined in Section 275(2) of the SFA, or any person pursuant to Section 275 (1A), and in accordance with the conditions, specified in Section 275 of the SFA or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA.

Where the shares are subscribed and purchased under Section 275 of the SFA by a relevant person which is:

- (a) a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or
- (b) a trust (where the trustee is not an accredited investor (as defined in Section 4A of the SFA)) whose sole whole purpose is to hold investments and each beneficiary is an accredited investor, shares, debentures and units of shares and debentures of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferable within six months after that corporation or that trust has acquired the shares under Section 275 of the SFA except:
 - (i) to an institutional investor under Section 274 of the SFA or to a relevant person (as defined in Section 275(2) of the SFA) and in accordance with the conditions, specified in Section 275 of the SFA;
 - (ii) (in the case of a corporation) where the transfer arises from an offer referred to in Section 275(1A) of the SFA, or (in the case of a trust) where the transfer arises from an offer that is made on terms that such rights or interests are acquired at a consideration of not less than S\$200,000 (or its equivalent in a foreign currency) for each transaction, whether such amount is to be paid for in cash or by exchange of securities or other assets;
 - (iii) where no consideration is or will be given for the transfer; or
 - (iv) where the transfer is by operation of law.

By accepting this prospectus supplement, the recipient hereof represents and warrants that he is entitled to receive it in accordance with the restrictions set forth above and agrees to be bound by limitations contained herein. Any failure to comply with these limitations may constitute a violation of law.

Table of Contents

Experts

The financial statements and the effectiveness of internal control over financial reporting in our Annual Report on Form 10-K and incorporated into this prospectus supplement by reference have been audited by Hein & Associates LLP, an independent registered public accounting firm, to the extent and for the periods set forth in their reports, and are incorporated in this prospectus supplement by reference in reliance upon such reports and upon the authority of such firm as experts in accounting and auditing.

Legal Matters

Certain legal matters with respect to the common stock will be passed upon for us by Holland & Knight LLP, Portland, Oregon. Morrison & Foerster LLP, New York, New York will pass upon certain legal matters for the underwriters in connection with this offering.

Information Incorporated by Reference

This prospectus supplement and the accompany prospectus are part of a registration statement on Form S-3. The SEC allows this filing to incorporate by reference information that the Company previously filed with the SEC. This means we can disclose important information to you by referring you to other documents that we have filed with the SEC. The information that is incorporated by reference is considered part of this prospectus supplement and information that the Company files later will automatically update and may supersede this information. For further information about us and the securities being offered, you should refer to the registration statement and the following documents that are incorporated by reference:

Our Annual Report on Form 10-K filed on March 12, 2009, which contains audited financial statements for the fiscal year ended December 31, 2008;

Our definitive proxy statement on Schedule 14A filed on May 14, 2008;

Our quarterly reports on Form 10-Q filed on May 7, 2009 and August 7, 2009 and our amended quarterly report on Form 10-Q/A filed on August 17, 2009;

Our current reports on Form 8-K filed on February 17, 2009, July 14, 2009, July 16, 2009, July 22, 2009, August 21, 2009, September 8, 2009 and September 21, 2009, to the extent filed and not furnished;

All other reports filed by us pursuant to Section 13(a) or 15(d) of the Exchange Act since the end of the fiscal year covered by the annual report referred to above; and

The description of our common stock contained in Forms 8-A filed on June 19, 2006 and August 8, 2006 and any amendments or reports filed for the purpose of updating such description.

All documents filed by the Company subsequent to those listed above with the SEC pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act and, prior to the termination of the offering, shall be deemed to be incorporated by reference into this prospectus supplement and to be a part hereof from the date of filing of such documents. Any statement contained in a document incorporated by reference herein shall be deemed to be modified or superseded for purposes of this prospectus supplement to the extent that a statement contained herein or in any other subsequently filed document which also is or is deemed to be incorporated by reference herein modifies or supersedes such statement. Any statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this prospectus supplement.

You may request a copy of all documents that are incorporated by reference in this prospectus by writing or telephoning us at the following address and number: Ascent Solar Technologies, Inc., Attention: Corporate Secretary, 12300 Grant Street, Thornton, Colorado 80241,

Edgar Filing: Ascent Solar Technologies, Inc. - Form 424B4

(720) 872-5000. We will provide copies of all documents requested (not including exhibits to those documents, unless the exhibits are specifically incorporated by reference into those documents or this prospectus) without charge.

S-43

Table of Contents

PROSPECTUS

ASCENT SOLAR TECHNOLOGIES, INC.

Up to \$150,000,000

COMMON STOCK

PREFERRED STOCK

WARRANTS

We may sell from time to time the securities offered by this prospectus at prices and on terms to be determined at or prior to the time of each sale. We will describe the specific terms and amounts of the securities offered in a prospectus supplement for each sale. You should carefully read this prospectus and any prospectus supplement before you invest. This prospectus may not be used to sell securities unless accompanied by a prospectus supplement.

Our common stock is traded on the Nasdaq Global Market under the symbol ASTI. On January 8, 2009, the last reported sale price of our common stock on the Nasdaq Global Market was \$4.04 per share.

Our principal executive offices are located at 8120 Shaffer Parkway, Littleton, Colorado 80127.

These are speculative securities. Investing in these securities involves significant risks. You should purchase these securities only if you can afford a complete loss of your investment. See Risk Factors beginning on page P-4.

NEITHER THE SECURITIES AND EXCHANGE COMMISSION NOR ANY STATE SECURITIES COMMISSION HAS APPROVED OR DISAPPROVED OF THESE SECURITIES OR PASSED UPON THE ADEQUACY OR ACCURACY OF THIS PROSPECTUS. ANY REPRESENTATION TO THE CONTRARY IS A CRIMINAL OFFENSE.

The date of this prospectus is January 16, 2009

Table of Contents

Table of Contents

	Page
<u>Prospectus Summary</u>	P-3
<u>Risk Factors</u>	P-4
<u>Forward-Looking Statements</u>	P-4
<u>Use of Proceeds</u>	P-6
<u>Plan of Distribution</u>	P-6
<u>Description of Securities</u>	P-7
<u>Experts</u>	P-13
<u>Legal Matters</u>	P-13
<u>Information Incorporated by Reference</u>	P-13
<u>Where You Can Find More Information</u>	P-14
<u>Indemnification</u>	P-14
<u>Disclosure of Commission Position on Indemnification of Securities Act Liabilities</u>	P-15

In this prospectus, references to we, us, our, Ascent, Ascent Solar or the Company mean Ascent Solar Technologies, Inc.

Table of Contents

About This Prospectus

This prospectus is part of a Registration Statement on Form S-3 that we filed with the Securities and Exchange Commission (SEC) using a shelf registration process. Under this shelf process, we may sell any combination of securities described in this prospectus in one or more offerings, up to the total dollar amounts appearing on the cover of this prospectus. This prospectus provides you with a general description of the securities we may offer. Each time we offer the securities, a prospectus supplement will be provided that will contain specific information about the terms of the offering, including the type(s), amount(s) and price(s) of the securities being offered and the plan of distribution. The prospectus supplement for a particular offering may also add, update or change information contained in this prospectus. In addition, any prospectus supplement relating to a particular offering may be updated or supplemented. You should read carefully both this prospectus and any applicable prospectus supplement together with the additional information about us to which we refer you in the section of this prospectus entitled Where You Can Find More Information.

You should rely only on the information contained or incorporated by reference in this prospectus or a prospectus supplement. We have not authorized any other person to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. You should not assume that the information appearing in this prospectus, any prospectus supplement or any document incorporated by reference is accurate as of any date other than its date, regardless of the time of delivery of the prospectus or prospectus supplement or any sale of securities. Our business, financial condition, results of operations and prospects may have changed since those dates.

Table of Contents

Prospectus Summary

This summary highlights information contained in this prospectus. While we believe that this summary highlights some of the most important information about Ascent Solar Technologies, Inc. and this offering, you should read this entire prospectus and the documents incorporated by reference carefully, including Risk Factors, before deciding to invest in our securities.

Business Overview

We are a development stage company formed in October 2005 to commercialize flexible photovoltaic (PV) modules using proprietary technology. Our technology was initially developed at ITN Energy Systems, Inc. (ITN) by our founder and core scientific team beginning in 1994 and subsequently assigned and licensed to us. Our proprietary manufacturing process deposits multiple layers of materials, including a thin film of highly efficient copper-indium-gallium-diselenide (CIGS) semiconductor material, on a flexible, lightweight, plastic substrate and then laser patterns the layers to create interconnected PV cells, or PV modules, in a process known as monolithic integration. We believe that our technology and manufacturing process provides us with significant advantages over both the crystalline silicon (c-Si) based PV manufacturers that currently dominate the PV market, as well as other thin-film PV manufacturers that use rigid and/or heavier substrate materials such as glass, stainless steel or other metals.

Our target markets include the building integrated PV (BIPV) market, in which solar modules are incorporated directly into building and construction materials, the electronic integrated PV (EIPV) market, in which solar modules are incorporated directly into portable electronic devices, and the commodity solar panel market. In the BIPV and EIPV markets, we intend to be the supplier of choice by offering high-performance, flexible PV modules that can be integrated directly into products such as roofing shingles, siding and facades, metal and composite panels and roofing membranes in the BIPV market, and electronic packages, casings, battery packs and portable power systems in the EIPV market. In the commodity solar panel market, we intend to leverage our low-cost manufacturing process to compete primarily on the basis of price.

We are incorporated under the laws of Delaware, our principal business office is located at 8120 Shaffer Parkway, Littleton, Colorado, and our telephone number is (303) 285-9885. Our website address is www.ascentsolar.com. Information contained on our website or any other website does not constitute part of this prospectus.

This Offering

Through this prospectus, we may from time to time offer and sell shares of our common stock, shares of our preferred stock, warrants (including, without limitation, our Class B warrants), and the securities issuable upon exercise or conversion of any of those securities . We may offer and sell these securities separately or together as units, but the aggregate initial offering price will not to exceed \$150,000,000 or the equivalent amount denominated in one or more foreign currencies. Each time we offer and sell the securities, a prospectus supplement will be provided that will contain specific information about the terms of the offering, including the type(s), amount(s) and price(s) of the securities being offered and the plan of distribution employed.

Table of Contents

Risk Factors

An investment in our securities involves a high degree of risk and many uncertainties discussed in the section entitled "Risk Factors" in our annual report on Form 10-K for the year ended December 31, 2007, which is incorporated by reference into this prospectus. You should carefully consider the risk factors before purchasing our securities. If one or more of the possibilities described as risks actually occurs, our operating results and financial condition would likely suffer and the trading price of our securities could fall, causing you to lose some or all of your investment in the securities we are offering.

Forward-Looking Statements

This prospectus includes forward-looking statements that involve risks and uncertainties. Forward-looking statements include statements concerning our plans, objectives, goals, strategies, future events, future net sales or performance, capital expenditures, financing needs, plans or intentions relating to acquisitions, business trends and other information that is not historical information and, in particular, appear under headings including Prospectus Summary. When used in this prospectus, the words estimates, expects, anticipates, projects, plans, intends, believes, forecasts, foresees, likely, may, should, goal, target and variations of such words or similar expressions are intended to identify forward-looking statements. All forward-looking statements are based upon information available to us on the date of this prospectus.

These forward-looking statements are subject to risks, uncertainties and other factors, many of which are outside of our control, that could cause actual results to differ materially from the results discussed in the forward-looking statements, including, among other things, the matters discussed in this prospectus in the section captioned "Risk Factors." Factors you should consider that could cause these differences are:

Our limited operating history and lack of profitability;

Our ability to meet the cost and performance metrics that we have forecasted;

Our ability to develop demand for, and sales of, our PV modules and establish strategic relationships with key partners, including original equipment manufacturers (OEMs), system integrators and distributors;

Our ability to obtain necessary or desired certifications for our PV modules;

Whether we receive timely delivery of production tools from our equipment suppliers;

Our ability to design, purchase, install, qualify and operate production tools pursuant to our business plan and within budgeted amounts;

The extent to which we are able to reduce the per watt manufacturing costs of our PV modules, and the extent to which our competitors are able to do the same with their PV modules;

Global demand for electricity and the market for renewable energy, including solar energy;

The cost-effectiveness of PV-generated energy relative not only to that generated from conventional sources such as fossil fuels, but also to that generated from other renewable sources such as wind, geothermal and tidal power;

Edgar Filing: Ascent Solar Technologies, Inc. - Form 424B4

The availability of, or changes to, government policies, subsidies and incentives that affect the use or cost of renewable energy;

The emergence of disruptive or competing technologies in the energy industry;

Our competitive position and that of our PV modules relative to others in the PV and thin-film markets;

The extent to which our interests align with or deviate from that of Norsk Hydro Produksjon AS, our largest stockholder (Norsk Hydro);

P-4

Table of Contents

Foreign currency exchange fluctuations, political instability in certain foreign markets or the general state of geopolitical affairs;

The supply and price of equipment, components and raw materials;

The status of our relationship with ITN;

Our ability to attract and retain key executives and employees;

Our continued investment in research and development, and our ability to remain competitive through development of new technologies;

The extent to which we are able to manage the expansion of our operations effectively, both domestically and abroad;

Commencement of legal proceedings against us or by us, including proceedings relating to environmental matters or intellectual property rights;

Our ability to expand and protect the intellectual property portfolio that relates to our PV modules and processes;

The extent to which we qualify to perform research and development under the federal government's SBIR program; and

General economic and business conditions.

There may be other factors that could cause our actual results to differ materially from the results referred to in the forward-looking statements. We undertake no obligation to publicly update or revise forward-looking statements to reflect subsequent events or circumstances after the date made or to reflect the occurrence of unanticipated events, except as required by law.

Table of Contents

Use of Proceeds

Unless we indicate otherwise in an applicable prospectus supplement, we currently intend to use the net proceeds from this offering primarily to purchase capital equipment and expand our rated production capacity in accordance with the commercialization and manufacturing expansion plan described in our annual and quarterly filings with the Securities and Exchange Commission. To a lesser extent, we may use some of the net proceeds to support our marketing and sales efforts, research and development activities and for general corporate and working capital purposes.

Except for estimated amounts needed to expand our rated production capacity in the increments announced by us, we have not determined the amounts we plan to spend on any of the areas listed above or the timing of these expenditures. As a result, our management will have broad discretion to allocate the net proceeds from this offering. Pending application of the net proceeds as described above, we intend to invest the net proceeds in short-term, investment-grade, interest-bearing securities.

We may set forth additional information on the use of net proceeds from the sale of securities we offer under this prospectus in a prospectus supplement relating to the specific offering.

Plan of Distribution

We may sell the securities being offered hereby in one or more of the following ways from time to time:

through dealers or agents to the public or to investors;

to underwriters for resale to the public or to investors;

directly to investors; or

through a combination of such methods.

We may sell the securities at a fixed price or prices that may change, at prevailing market prices, at prices relating to prevailing market prices or at negotiated prices. Each time we sell securities in a particular offering, we will set forth in a prospectus supplement the terms of the offering of securities, including:

the material terms of the distribution, including the number of shares and the consideration paid;

the identity of any underwriters, dealers, agents or purchasers that will purchase the securities;

the type and amount of any compensation, discounts or commissions to be received by underwriters, dealers or agents;

the purchase price of the securities being offered and the proceeds we will receive from the sale;

the nature of any transactions by underwriters, dealers or agents during the offering that are intended to stabilize or maintain the market price of our securities; and

the terms of any indemnification provisions.

Underwriters, dealers and agents that participate in the distribution of the securities may be deemed to be underwriters as defined in the Securities Act of 1933, as amended (the Securities Act), and any discounts or commissions they receive from us and any profit on their resale of the securities may be treated as underwriting discounts and commissions under the Securities Act. We will identify in the applicable prospectus supplement any underwriters, dealers or agents and will describe their compensation. We may have agreements with the underwriters, dealers and agents to indemnify them against specified civil liabilities, including liabilities under the Securities Act. Underwriters, dealers and agents may engage in transactions with or perform services for us or our subsidiary in the ordinary course of their businesses.

P-6

Table of Contents

Certain persons that participate in the distribution of the securities may engage in transactions that stabilize, maintain or otherwise affect the price of the securities, including over-allotment, stabilizing and short-covering transactions in such securities, and the imposition of penalty bids, in connection with an offering. Certain persons may also engage in passive market-making transactions as permitted by Rule 103 of Regulation M. Passive market makers must comply with applicable volume and price limitations and must be identified as passive market makers. In general, a passive market maker must display its bid at a price not in excess of the highest independent bid for such security; if all independent bids are lowered below the passive market maker's bid, however, the passive market maker's bid must then be lowered when certain purchase limits are exceeded.

Description of Securities

Our authorized capital stock consists of 75,000,000 shares of common stock, \$0.0001 par value, and 25,000,000 shares of preferred stock, \$0.0001 par value. As of January 2, 2009, we had 20,943,882 shares of common stock and no shares of preferred stock outstanding.

The following is a summary of the rights of our common stock, preferred stock and certain outstanding rights to obtain our common stock. For more detailed information about our capital stock, please see our certificate of incorporation and bylaws, both as amended (our Certificate of Incorporation and Bylaws, respectively).

Common Stock

Holders of our common stock are entitled to one vote for each share on all matters submitted to a stockholder vote and may not cumulate their votes. Holders of common stock are entitled to share in all dividends that our Board of Directors (our Board), in its discretion, declares from legally available funds. In the event of our liquidation, dissolution or winding up, each outstanding share entitles its holder to participate pro rata in all assets that remain after payment of liabilities and after providing for each class of stock, if any, having preference over the common stock.

Except for Norsk Hydro, which holds pre-emptive rights with respect to certain equity issuances by us (on terms no less favorable than any such issuance) in order to maintain its percentage ownership in our common stock, holders of our common stock have no conversion, preemptive or other subscription rights, and there are no redemption provisions applicable to our common stock. The rights of the holders of common stock are subject to any rights that may be fixed for holders of preferred stock.

Preferred Stock

Our Board is authorized by our Certificate of Incorporation to establish classes or series of preferred stock and fix the designation, powers, preferences and rights of the shares of each such class or series and the qualifications, limitations or restrictions thereof without any further vote or action by our stockholders. Any shares of preferred stock so issued could have priority over our common stock with respect to dividend or liquidation rights. Any future issuance of preferred stock may have the effect of delaying, deferring or preventing a change in our control without further action by our stockholders and may adversely affect the voting and other rights of the holders of our common stock. At present we have no plans to issue any shares of preferred stock or to adopt any new series, preferences or other classification of preferred stock.

The issuance of shares of preferred stock, or the issuance of rights to purchase such shares, could be used to discourage an unsolicited acquisition proposal. For instance, the issuance of a series of preferred stock might impede a business combination by including class voting rights that would enable a holder to block such a transaction. In addition, under certain circumstances, the issuance of preferred stock could adversely affect the voting power of holders of our common stock. Although our Board is required to make any determination to

Table of Contents

issue preferred stock based on its judgment as to the best interests of our stockholders, our Board could act in a manner that would discourage an acquisition attempt or other transaction that some, or a majority, of our stockholders might believe to be in their best interests or in which such stockholders might receive a premium for their stock over the then market price of such stock. Our Board presently does not intend to seek stockholder approval prior to the issuance of currently authorized stock, unless otherwise required by law or applicable stock exchange rules.

Class A Warrants

General. In May 2007, we called all of our outstanding Class A warrants for redemption; consequently, there are no Class A warrants outstanding. However, upon exercise of 112,500 outstanding warrants held by the representative of the underwriters of our initial public offering (IPO), we may issue up to 112,500 Class A warrants to the representative. Because those Class A warrants will be immediately subject to a call for redemption at \$0.25 per warrant, the representative will then have to decide whether to exercise its Class A warrants or hold them for redemption. Each Class A warrant entitles the holder to purchase one share of common stock at an exercise price of \$6.60 per share.

Redemption. We have the right to redeem the Class A warrants at a price of \$0.25 per warrant, after providing 30 days prior written notice to the Class A warrant holders. In May 2007, we called our outstanding Class A public warrants for redemption, and all such Class A public warrants that remained unexercised as of June 25, 2007, the announced redemption date, are now expired. Consequently, as of January 2, 2009, there were no Class A warrants outstanding, although as of January 2, 2009, 9,090 Class A warrants had not yet been surrendered to our transfer agent for redemption at \$0.25 per warrant. However, the representative of the underwriters in our IPO is entitled to receive Class A warrants upon exercise of certain warrants it received in connection with our IPO. Such Class A warrants will not be freely tradeable and will be immediately subject to a call for redemption at \$0.25 per warrant. The representative will then have to decide whether to exercise its Class A warrants or hold them for redemption.

Class B Warrants

General. As of January 2, 2009, we had 10,502,583 Class B warrants outstanding. Our Class B warrants may be exercised until their expiration date, which is July 10, 2011. Each Class B warrant entitles the holder to purchase one share of our common stock at an exercise price of \$11.00 per share. This exercise price will be adjusted if specific events, summarized below, occur. A holder of Class B warrants will not be deemed a holder of the underlying stock for any purpose until the warrant is exercised. If, at their expiration date, the Class B warrants are not currently exercisable, the expiration date will be extended for 30 days following notice to the holders of the warrants that the warrants are again exercisable. If we cannot honor the exercise of Class B warrants and the securities underlying the Class B warrants are listed on a securities exchange or if there are three independent market makers for the underlying securities, we may, but are not required to, settle the warrants for a price equal to the difference between the closing price of the underlying securities and the exercise price of the warrants. Our Class B warrants are traded on the Nasdaq Global Market under the symbol ASTIZ.

No Redemption. The Class B warrants are non-redeemable.

Provisions Applicable to the Class A and Class B Warrants

Exercise. The holders of the warrants may exercise them only if a current registration statement is then in effect. Fractional shares of common stock will not be issued upon exercise of the warrants.

Adjustments in Certain Events. The warrants provide for adjustment of the number of shares for which each warrant is exercisable if certain events occur. If we distribute to our stockholders additional shares of common stock through a dividend or distribution, or if we effect a stock split of our common stock, the total number of

Table of Contents

shares of common stock purchasable on exercise of a warrant will be adjusted so that the holder of a warrant thereafter exercised will be entitled to receive the number of shares of common stock the holder would have owned or received after such event if the warrant holder had exercised the warrant before the event causing the adjustment and held the securities received on such exercise through the record date for the event. The aggregate exercise price of the warrant will remain the same in that circumstance, but the effective purchase price per share of common stock purchasable upon exercise of the warrant will be proportionately reduced because a greater number of common stock shares will then be purchasable upon exercise of the adjusted warrant. We will make equivalent changes in the warrants if we effect a reverse stock split.

In the event of a capital reorganization or reclassification of our common stock, the warrants will be adjusted so that thereafter each warrant holder will be entitled to receive upon exercise the same number and kind of securities that such holder would have received if the warrant had been exercised before the capital reorganization or reclassification of our common stock and the securities received on such exercise had been held through the record date of the recapitalization.

If we merge or consolidate with another corporation, or if we sell our assets as an entirety or substantially as an entirety to another corporation, we will make provisions so that warrant holders will be entitled to receive upon exercise of a warrant the kind and number of securities, cash or other property that would have been received as a result of the transaction by a person who was our stockholder immediately before the transaction and who owned the same number of shares of common stock for which the warrant was exercisable immediately before the transaction. No adjustment to the warrants will be made, however, if a merger or consolidation does not result in any reclassification or change in our outstanding common stock.

2005 Stock Option Plan

Our 2005 Stock Option Plan, as amended (the Option Plan), currently authorizes the grant of up to 1,500,000 shares of common stock (subject to adjustment for stock splits and similar capital changes) in connection with incentive stock option grants and non-qualified stock option grants. Employees and, in the case of nonqualified stock options, directors, consultants or other service providers are eligible to receive grants under our plans. According to the terms of the Option Plan, no employee may be granted, in any fiscal year, options to purchase more than 100,000 shares. As of January 2, 2009, there were outstanding and unexercised options to purchase 1,092,200 shares under our Option Plan.

2008 Restricted Stock Plan

Our 2008 Restricted Stock Plan, as amended (the Stock Plan), currently authorizes the grant of up to 750,000 shares of restricted common stock and restricted stock units (subject to adjustment for stock splits and similar capital changes) to employees, directors, consultants or other service providers. According to the terms of the Stock Plan, no individual may be granted, in any fiscal year, more than 200,000 shares. Vesting of shares of restricted stock granted under the Stock Plan may occur over a specified period of time or based upon performance metrics announced at the time of grant. As of January 2, 2009, 40,000 shares of restricted stock had been granted and were outstanding under our Stock Plan. As of January 2, 2009, 68,444 restricted stock units had been granted under our Stock Plan, of which 0 were vested and outstanding.

Norsk Hydro options

In March 2007, we sold 1,600,000 shares of our restricted common stock to Norsk Hydro in a private placement pursuant to Rule 506 of Regulation D and Section 4(2) of the Securities Act. We also granted two options to Norsk Hydro:

The Initial Warrants Option to purchase restricted Class A warrants (or if the Class A warrants are redeemed, common stock) and restricted Class B warrants that are otherwise identical to the Class A

Table of Contents

warrants formerly traded, and Class B warrants currently traded, on Nasdaq under the symbols ASTIW and ASTIZ, respectively. Norsk Hydro exercised this option in August 2007 to purchase 934,462 additional shares of common stock and 1,965,690 Class B warrants.

The Tranche 2 Option to purchase additional shares of restricted common stock, Class A warrants (or if the Class A warrants are redeemed, common stock) and Class B warrants that would result in Norsk Hydro owning up to 35% of our issued and outstanding common stock, Class A warrants and Class B warrants. Pursuant to its Tranche 2 Option, in March 2008, Norsk Hydro acquired an additional 2,341,897 restricted shares of our common stock and 1,689,905 Class B warrants. Gross proceeds to us from this exercise were approximately \$28.4 million. In October 2008, Hydro acquired an additional 2,421,801 shares of the Company's common stock. Gross proceeds to us from this exercise were approximately \$15 million. The gross proceeds from each exercise reflected per share and per warrant purchase prices equal to the average of the closing bids of each security, as reported by Nasdaq, for the five consecutive trading days preceding each exercise.

Until June 15, 2009, the second option entitles Norsk Hydro to purchase from us additional restricted shares of common stock and Class B warrants to maintain its ownership of up to 35% of our issued and outstanding common stock and Class B warrants. The purchase price of each security obtained will be equal to the average of the closing bids of the security in the five consecutive trading days ending on and including the trading day that is one day prior to the date of exercise, as reported by Nasdaq.

In connection with the sale of these securities, Norsk Hydro received: piggyback registration rights that enable them to require us to register for resale the shares held by them if we engage in a registered public offering; and demand registration rights that became effective in March 2008. Norsk Hydro also holds pre-emptive rights with respect to certain equity issuances by us (on terms no less favorable than any such issuance) in order to maintain its percentage ownership in our common stock, but the pre-emptive rights do not apply to bona fide underwritten public offerings by us.

IPO Warrants

In connection with our IPO, we issued warrants (IPO Warrants) to purchase 300,000 units (each unit consisting of one share of common stock, one Class A warrant and two Class B warrants) to the representative of the underwriters of our IPO. The IPO Warrants may be exercised until July 10, 2011. As of January 2, 2009, IPO Warrants to purchase 112,500 units remain unexercised. To the extent that holders of the IPO Warrants are entitled to receive Class A warrants upon exercise of the IPO Warrants, those Class A warrants will be immediately subject to a call for redemption at \$0.25 per warrant. The holders will then have to decide whether to exercise their Class A warrants or hold them for redemption. We have agreed to keep a registration statement covering the issuance and resale of the securities underlying the IPO Warrants effective until the earlier of July 10, 2011 and the time that all of the IPO Warrants have been exercised. If we cannot honor the exercise of the IPO Warrants and the securities underlying the IPO Warrants are listed on a securities exchange or if there are three independent market makers for the underlying securities, we may, but are not required to, settle the IPO Warrants for a price equal to the difference between the closing price of the underlying securities and the exercise price of the IPO Warrants. Because we are not required to settle the IPO Warrants by payment of cash, it is possible that the IPO Warrants will never be settled in shares or payment of cash.

Authorized but Unissued Shares

The authorized but unissued shares of common and preferred stock are available for future issuance without stockholder approval, unless otherwise required by law or applicable stock exchange rules. These additional shares may be used for a variety of corporate purposes, including future public offerings to raise additional capital, corporate acquisitions and employee benefit plans. The existence of authorized but unissued shares could hinder or discourage an attempt to obtain control of us by means of a proxy contest, tender offer, merger or otherwise.

Table of Contents

Anti-takeover Effects of Certain Provisions of Delaware Law and Our Certificate of Incorporation and Bylaws

Our Certificate of Incorporation and Bylaws contain a number of provisions that could make our acquisition by means of a tender or exchange offer, a proxy contest or otherwise more difficult. These provisions are summarized below.

Removal of Directors. Our Bylaws provide that our directors may only be removed by the affirmative vote of the shares entitled to vote at an election of directors, or for cause by a majority of the Board. Although our Bylaws do not give the Board the power to approve or disapprove stockholder nominations for the election of directors or of any other business stockholders desire to conduct at an annual or any other meeting, the Bylaws may have the effect of precluding a nomination for the election of directors or precluding the conduct of business at a particular annual meeting if the proper procedures are not followed, or discouraging or deterring a third party from conducting a solicitation of proxies to elect its own slate of directors or otherwise attempting to obtain control, even if the conduct of that solicitation or attempt might be beneficial to our stockholders.

Staggered Board. Staggered terms tend to protect against sudden changes in management and may have the effect of delaying, deferring or preventing a change in our control without further action by our stockholders. Our Board is divided into three classes, with one class of directors elected at each year's annual stockholder meeting.

Special Meetings. Our Bylaws provide that special meetings of stockholders can be called by the President, at the request of a majority of the Board or at the written request of holders of at least 50% of the shares outstanding and entitled to vote.

Undesignated Preferred Stock. The ability to authorize undesignated preferred stock makes it possible for our Board of Directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to acquire us. These and other provisions may have the effect of deferring hostile takeovers or delaying changes in control or management of our Company.

Delaware Anti-Takeover Statute. We are subject to the provisions of Section 203 of the Delaware General Corporation Law regulating corporate takeovers. In general, Section 203 prohibits a publicly held Delaware corporation from engaging under certain circumstances in a business combination with an interested stockholder for a period of three years following the date the person became an interested stockholder unless:

Prior to the date of the transaction that resulted in the stockholder becoming an interested stockholder, the board of directors of the corporation approved either the business combination or the transaction which resulted in the stockholder becoming an interested stockholder.

Upon completion of the transaction that resulted in the stockholder becoming an interested stockholder, the stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding for purposes of determining the number of shares outstanding (1) shares owned by persons who are directors and also officers and (2) shares owned by employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer.

On or subsequent to the date of the transaction that resulted in the stockholder becoming an interested stockholder, the business combination is approved by the board and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least $66\frac{2}{3}\%$ of the outstanding voting stock which is not owned by the interested stockholder.

Generally, a business combination includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. An interested stockholder is a person who, together with affiliates and associates, owns or, within three years prior to the determination of interested stockholder status, did own 15% or more of a corporation's outstanding voting securities. We expect the existence of this provision to have

Table of Contents

an anti-takeover effect with respect to transactions our Board does not approve in advance. We also anticipate that Section 203 may also discourage attempts that might result in a premium over the market price for the shares of common stock held by stockholders.

The provisions of Delaware law, our Certificate of Incorporation and our Bylaws could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they may also inhibit temporary fluctuations in the market price of our common stock that often result from actual or rumored hostile takeover attempts. These provisions may also have the effect of preventing changes in our management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders may otherwise deem to be in their best interests.

Listing

Our common stock is listed on the Nasdaq Global Market under the trading symbol ASTI.

Transfer Agent and Registrar

The transfer agent and registrar of our common stock is Computershare Investor Services.

Table of Contents

Experts

The financial statements included in our annual report on Form 10-K for the year ended December 31, 2007 and incorporated into this prospectus by reference have been audited by Hein & Associates LLP, an independent registered public accounting firm, to the extent and for the periods set forth in their report, and are incorporated in this prospectus by reference in reliance upon such report given upon the authority of them as experts in auditing and accounting.

Legal Matters

The validity of the securities offered hereby will be passed on by Holland & Knight LLP, Portland, Oregon.

Information Incorporated by Reference

This prospectus is part of a registration statement on Form S-3. The SEC allows this filing to incorporate by reference information that the Company previously has filed with the SEC. This means the Company can disclose important information to you by referring you to other documents that it has filed with the SEC. The information that is incorporated by reference is considered part of this prospectus, and information that the Company files later will automatically update and may supersede this information. For further information about the Company and the securities being offered, you should refer to the registration statement and the following documents that are incorporated by reference:

Our annual report on Form 10-K filed on March 14, 2008, which contains audited financial statements for the fiscal year ended December 31, 2007;

Our definitive proxy statement on Schedule 14A filed on May 15, 2008;

Our quarterly reports on Forms 10-Q filed on April 29, 2008, August 8, 2008 and November 10, 2008;

Our current reports on Forms 8-K filed on January 11, 2008, February 12, 2008, February 28, 2008, March 20, 2008, March 27, 2008, March 31, 2008, May 16, 2008, May 20, 2008, May 21, 2008, July 2, 2008, September 22, 2008, October 8, 2008, October 17, 2008 and October 20, 2008;

All other reports filed by us pursuant to Section 13(a) or 15(d) of the Exchange Act since the end of the fiscal year covered by the annual report referred to above; and

The description of our common stock contained in Forms 8-A filed on June 19, 2006 and August 8, 2006 and any amendments or reports filed for the purpose of updating such description.

All documents filed by the Company subsequent to those listed above with the SEC pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act, prior to the termination of the offering, shall be deemed to be incorporated by reference into this prospectus and to be a part hereof from the date of filing of such documents. Any statement contained in a document incorporated by reference herein shall be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained herein or in any other subsequently filed document which also is or is deemed to be incorporated by reference herein modifies or supersedes such statement. Any statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this prospectus.

You may request a copy of all documents that are incorporated by reference in this prospectus by writing or telephoning us at the following address and number: Ascent Solar Technologies, Inc., Attention: Corporate Secretary, 8120 Shaffer Parkway, Littleton, Colorado 80127, telephone (303) 285-9885. We will provide copies of all documents requested (not including exhibits to those documents, unless the exhibits are specifically incorporated by reference into those documents or this prospectus) without charge.

Table of Contents

Where You Can Find More Information

This prospectus is part of a registration statement on Form S-3 filed with the SEC under the Securities Act. This prospectus does not contain all the information set forth in the registration statement because certain information has been incorporated into the registration statement by reference in accordance with the rules and regulations of the SEC. Please review the documents incorporated by reference for a more complete description of the matters to which such documents relate.

We are subject to the informational reporting requirements of the Exchange Act. In accordance with the Exchange Act, we file reports, proxy statements, and other information with the SEC. You can inspect and copy these reports, proxy statements, and other information at the Public Reference Room of the SEC, 100 F Street, N.E., Washington, D.C. 20549, at prescribed rates. Please call the SEC at 1-800-SEC-0330 for further information on the operation of the public reference rooms. Our SEC filings are also available on the SEC's web site. The address of this site is <http://www.sec.gov>.

Indemnification

Our Certificate of Incorporation contains provisions that limit the liability of our directors for monetary damages to the fullest extent permitted by Delaware law. Consequently, our directors will not be personally liable to stockholders for monetary damages for any breach of fiduciary duties as directors, except liability for the following:

Any breach of their duty of loyalty to our company or our stockholders;

Acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law;

Unlawful payments of dividends or unlawful stock repurchases or redemptions as provided in Section 174 of the Delaware General Corporation Law; and

Any transaction from which the director derived an improper personal benefit.

Our Bylaws provide that we are required to indemnify our directors and officers and may indemnify our employees and other agents to the fullest extent permitted by Delaware law. Our Bylaws also provide that we shall advance expenses incurred by a director or officer before the final disposition of any action or proceeding upon receipt of an undertaking from or on behalf of that director or officer to repay the advance if it is ultimately determined that he or she is not entitled to be indemnified. We have entered and expect to continue to enter into agreements to indemnify our directors, executive officers and other employees as determined by the Board. These agreements provide for indemnification for related expenses including attorneys' fees, judgments, fines and settlement amounts incurred by any of these individuals in any action or proceeding. We believe that these provisions and indemnification agreements are necessary to attract and retain qualified persons as directors and officers. We also maintain directors' and officers' liability insurance.

The limitation of liability and indemnification provisions in our Certificate of Incorporation and Bylaws may discourage stockholders from bringing a lawsuit against our directors for breach of their fiduciary duty. They may also reduce the likelihood of derivative litigation against our directors and officers, even though an action, if successful, might benefit us and other stockholders. Furthermore, a stockholder's investment may be adversely affected to the extent that we pay the costs of settlement and damage awards against directors and officers as required by these indemnification provisions. At present, there is no pending litigation or proceeding involving any of our directors, officers or employees regarding which indemnification is sought, and we are not aware of any threatened litigation that may result in claims for indemnification.

Table of Contents

Disclosure of Commission Position on Indemnification of Securities Act Liabilities

Insofar as indemnification for liabilities arising under the Securities Act may be permitted for directors, officers or persons controlling the Company pursuant to applicable state law, the Company has been informed that, in the opinion of the SEC, such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

P-15

Table of Contents

[] Shares

Ascent Solar Technologies, Inc.

Common Stock

Prospectus Supplement

October , 2009

Barclays Capital

Cowen and Company

Raymond James