Celsion CORP
Form S-3
September 07, 2018

As filed with the Securities and Exchange Commission on September 7, 2018

Registration No. 333-

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

FORM S-3

REGISTRATION STATEMENT

UNDER

THE SECURITIES ACT OF 1933

CELSION CORPORATION

(Exact name of registrant as specified in its charter)

Delaware	**52-1256615**
(State or other jurisdiction of	(I.R.S. Employer

incorporation or organization) Identification No.)

997 Lenox Drive, Suite 100

Lawrenceville, New Jersey 08648

(609) 896-9100

(Address, including zip code, and telephone number, including area code, of Registrant's principal executive offices)

Michael H. Tardugno

President and Chief Executive Officer

997 Lenox Drive, Suite 100

Lawrenceville, New Jersey 08648

(609) 896-9100

(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copy to:

Sam Zucker, Esq.

Sidley Austin LLP

1001 Page Mill Road, Building 1

Palo Alto, CA 94304

Telephone: (650) 565-7000

Approximate date of commencement of proposed sale to the public:

From time to time or at one time as determined by the Registrant after the effective date of this registration statement.

If the only securities being registered on this Form are being offered pursuant to dividend or interest reinvestment plans, please check the following box. [ ]

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, other than securities offered only in connection with dividend or interest reinvestment plans, check the following box. [X]

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. [ ]

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. [ ]

If this Form is a registration statement pursuant to General Instruction I.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, check the following box. [ ]

If this Form is a post-effective amendment to a registration statement filed pursuant to General Instruction I.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, check the following box. [ ]

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

Large accelerated filer	[ ]	Accelerated filer	[ ]
Non-accelerated filer	[ ] (Do not check if smaller reporting company)	Smaller reporting company	[X]
		Emerging growth company	[ ]

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 7(a)(2)(B) of the Securities Act. [ ]

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Amount to be Registered(1)	Proposed Maximum Aggregate Offering Price per Security(2)	Proposed Maximum Aggregate Offering Price(3)	Amount of Registration Fee(4)(5)(6)
Primary Offering:				
Common Stock, par value $0.01 per share				
Preferred Stock, par value $0.01 per share				
Debt Securities				
Warrants				
Rights				
Units				
Secondary Offering:				
Common Stock, par value $0.01 per share	190,114	$ 2.63	$499,999.82	$ 62.25
TOTAL	$75,499,999.82		$75,499,999.82	$ 9,399.75

(1) In connection with the primary offering, this registration statement registers such indeterminate number of shares of common stock and preferred stock, such indeterminate principal amount of debt securities, such indeterminate number of warrants to purchase common stock or preferred stock of one or more series, such indeterminate number of rights to purchase common stock or preferred stock of one or more series and such indeterminate number of units representing an interest in one or more shares of common stock or preferred stock, debt securities, warrants or rights in any combination as shall have an aggregate initial offering price not to exceed $75,000,000. Any securities registered hereunder may be sold separately or as units with other securities registered hereunder. In connection with the secondary offering, the amount to be registered represents a maximum of 190,114 shares of Common Stock, par value $0.01, of the registrant issuable upon exercise of certain outstanding warrants at an exercise price of $2.63 to be offered and sold by the selling stockholder identified in this registration statement.

(2) The proposed maximum initial offering price per unit will be determined by the registrant, from time to time, in connection with the issuance by the registrant of the securities registered hereunder. The securities registered also include such indeterminate amounts and numbers of shares of common stock and preferred stock and debt securities as may be issued upon conversion of, or exchange for, preferred stock or debt securities that provide for conversion or exchange, upon exercise of warrants or rights or pursuant to the anti-dilution provisions of such securities. In addition, pursuant to Rule 416 under the Securities Act, the shares being registered hereunder include such indeterminate number of shares of common stock and preferred stock as may be issuable with respect to the shares being registered hereunder as a result of stock splits, stock dividends or similar transactions.

(3) The proposed maximum aggregate offering price per class of security will be determined from time to time by the registrant in connection with the issuance by the registrant of the securities registered hereunder and is not

specified as to each class of security pursuant to General Instruction II.D. of Form S-3 under the Securities Act.

(4) With respect to the primary offerings, the registration fee has been calculated in accordance with Rule 457(o) under the Securities Act of 1933, as amended

(5) With respect to the secondary offering, the registration fee has been estimated solely for the purpose of computing the amount of the registration fee for the shares of common stock issuable upon exercise of warrants being registered in accordance with Rule 457(g) under the Securities Act of 1933, as amended, based upon the higher of (i) the price at which the warrants may be exercised, and (ii) $2.89, the average of the high and low prices for a share of the registrant's common stock as reported on The Nasdaq Capital Market on September 5, 2018, which date is a date within five business days of the filing of this registration statement.

(6) The registrant paid a filing fee of $8,715.00 in connection with the registration of $75,000,000 of securities on a shelf registration statement on Form S-3, File No. 333-206789 (the "2015 Registration Statement"). The 2015 Registration Statement is subject to expiration on the third anniversary of the date it was declared effective by the Commission pursuant to Rule 415(a)(5) under the Securities Act with respect to the securities to be offered by the registrant thereunder. The $75,499,999.82 of securities covered by this registration statement consist of $45,837,524 of unsold securities from the 2015 Registration Statement (the "Unsold Securities") and $29,662,475.82 of new securities covered by this registration statement. Pursuant to Rule 415(a)(6) under the Securities Act, the Unsold Securities and the related filing fee of $8,715.00 previously paid in connection with the 2015 Registration Statement are being carried forward to this registration statement. The filing fee of $3,692.98 that is being paid with respect to the $29,662,475.82 of new securities covered by this registration statement registered hereunder in connection with primary offerings by the registrant has been calculated in accordance with Rule 457(o). Pursuant to Rule 415(a)(6) under the Securities Act, the offering of securities on the 2015 Registration Statement will be deemed terminated as of the date of the effectiveness of this registration statement

The registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the registrant shall file a further amendment which specifically states that this registration statement shall thereafter become effective in accordance with section 8(a) of the Securities Act of 1933 or until this registration statement shall become effective on such date as the Commission acting pursuant to said section 8(a), may determine.

The information in this prospectus is not complete and may be changed. Neither we nor the selling stockholder may sell these securities until the registration statement filed with the U.S. Securities and Exchange Commission is effective. This prospectus is not an offer to sell these securities and neither we nor the selling stockholder are soliciting offers to buy these securities in any jurisdiction where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED SEPTEMBER 7, 2018

PROSPECTUS

$75,000,000

Common Stock

Preferred Stock

Debt Securities

Warrants

Rights

Units

and

190,114 Shares of Common Stock

Issuable upon Exercise of Outstanding Warrants

Offered by the Selling Stockholder

This prospectus relates to a primary offering by the Company and a secondary offering by the selling stockholder.

In the primary offering, from time to time, we may offer or sell, together or separately, in one or more offerings:

common stock;

preferred stock;

debt securities;

warrants to purchase common stock or preferred stock;

rights to purchase common stock or preferred stock; and

units comprised of two or more of the foregoing securities.

We may sell any combination of these securities in one or more offerings, up to an aggregate offering price of $75,000,000, in amounts, at prices and on terms to be determined at the time of each offering thereof. This prospectus provides you with a general description of the securities we may offer. Each time we offer securities using this prospectus, we will provide the specific terms of the securities and the offering in one or more supplements to this prospectus. We may also authorize one or more free writing prospectuses to be provided to you in connection with these offerings. The prospectus supplement and any related free writing prospectus may also add to, update or change the information contained in this prospectus and will also describe the specific manner in which we will offer the securities.

The securities may be sold directly by us to investors, through agents designated from time to time or to or through underwriters or dealers, on a continuous or delayed basis. For additional information on the methods of sale, you should refer to the section titled “Plan of Distribution” in this prospectus. If any agents or underwriters are involved in the sale of any securities with respect to which this prospectus is being delivered, the names of such agents or underwriters and any applicable fees, commissions, discounts and over-allotment options will be set forth in a prospectus supplement. The price to the public of such securities and the net proceeds that we expect to receive from such sale will also be set forth in a prospectus supplement.

This prospectus may not be used to sell any securities unless accompanied by a prospectus supplement. You should carefully read this prospectus, any accompanying prospectus supplement and any related free writing prospectus, as well as any documents incorporated by reference, prior to investing in any of our securities.

This prospectus also relates to the resale, from time to time, by the selling stockholder identified in this prospectus under the caption “Selling Stockholder,” of up to 190,114 shares of our common stock, par value $0.01 per share, issuable upon exercise of the certain Warrants to Purchase Shares of Common Stock (the “Warrants”) on the terms described in this prospectus or in an applicable prospectus supplement. We will not receive any proceeds from the sale of shares of common stock by the selling stockholder. We will receive proceeds from cash exercise of the Warrants, which, if exercised in cash with respect to all of the 190,114 shares of common stock, would result in gross proceeds of approximately $500,000 to us. The selling stockholder will bear all commissions and discounts, if any, attributable to the sale of the shares.

The selling stockholder may sell the shares of our common stock offered by this prospectus from time to time on terms to be determined at the time of sale through ordinary brokerage transactions or through any other means described in this prospectus under the caption "Plan of Distribution." The shares of common stock may be sold at fixed prices, at market prices prevailing at the time of sale, at prices related to prevailing market price or at negotiated prices.

Investing in our securities involves a high degree of risk. You should review carefully the risks and uncertainties described under the heading "Risk Factors" beginning on page 10 of this prospectus, in any accompanying prospectus supplement and in any related free writing prospectus, and under similar headings in the documents incorporated by reference into this prospectus, any accompanying prospectus supplement and any related free writing prospectus.

Our common stock is traded on The NASDAQ Capital Market under the symbol "CLSN." On September 6, 2018, the last reported sale price of our common stock on The NASDAQ Capital Market was $2.85 per share. We do not expect our preferred stock, debt securities, warrants, rights or units to be listed on any securities exchange or over-the-counter market unless otherwise described in the applicable prospectus supplement.

As of September 5, 2018, the aggregate market value of our voting and non-voting common stock held by non-affiliates pursuant to General Instruction I.B.6. of Form S-3 was $49.3 million which was calculated based on 17,806,648 outstanding shares of our voting and non-voting common stock held by non-affiliates and at a price of $2.77 per share, the closing sale price of our common stock reported on The NASDAQ Capital Market on September 5, 2018. As a result, we are eligible to offer and sell up to an aggregate of 19,330,540 of shares of our common stock pursuant to General Instruction I.B.6. of Form S-3. During the 12 calendar months prior to and including the date of this prospectus, we have offered and sold $450,000 of securities under this Registration Statement and or our Registration Statement (File No. 333-206789) filed on September 4, 2015 pursuant to General Instruction I.B.6 of Form S-3. In no event will we sell the securities covered hereby in a public primary offering with a value exceeding more than one-third of our public float in any 12-month period so long as our public float remains below $75.0 million.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is , 2018

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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) utilizing a “shelf” registration process. Under this shelf registration process, we may, from time to time, offer shares of our common stock, shares of our preferred stock, debt securities, warrants, rights or units comprised of two or more of the foregoing securities in one or more offerings, for a total maximum offering price not to exceed $75,000,000.

In addition, this prospectus relates to the resale, from time to time, by the selling stockholder identified in this prospectus under the caption “Selling Stockholder,” of up to 190,114 shares of our common stock, par value $0.01 per share, issuable upon exercise of certain Warrants. As described below under “Selling Stockholder”, on page 24 the Warrants are immediately exercisable for cash or by net exercise from the date of grant and will expire after ten years from the date of grant. The Warrants are exercisable for a total of 190,114 shares of common stock at $2.63 per share by the selling stockholder. We will not receive any proceeds from the sale of shares of common stock by the selling stockholder. We will receive proceeds from the cash exercise of the warrants which, if exercised in cash with respect to all of the 190,114 shares of common stock, would result in gross proceeds of approximately $500,000 to us.

This prospectus provides you with a general description of the securities we may offer. Each time we sell any securities under this prospectus, we will provide a prospectus supplement that will contain more specific information about the terms of that specific offering, including the specific amounts, prices and terms of the securities offered. Any prospectus supplement may include a discussion of risks or other special considerations applicable to us or the offered securities. Any prospectus supplement may also add to, update or change information contained in this prospectus. To the extent there is a conflict between the information contained in this prospectus, on the one hand, and the information contained in any prospectus, on the other hand, you should rely on the information in the prospectus supplement. If any statement in one of these documents is inconsistent with a statement in another document having a later date-for example, a document incorporated by reference in the accompanying prospectus-the statement in the document having the later date modifies or supersedes the earlier statement.

This prospectus and any applicable prospectus supplement contain and incorporate by reference market data, industry statistics and other data that have been obtained or compiled from information made available by third parties. These data, to the extent they contain estimates or projections, involve a number of assumptions and limitations, and you are cautioned not to give undue weight to such estimates or projections. Industry publications and other reports we have obtained from independent parties generally state that the data contained in these publications or other reports have been obtained in good faith or from sources considered to be reliable, but they do not guarantee the accuracy or completeness of such data.

We urge you to carefully read this prospectus, any applicable prospectus supplement and any related free writing prospectus, any documents that we incorporate by reference in this prospectus, any applicable prospectus supplement and any related free writing prospectus, and the additional information described below under “Where You Can Find More Information” and “Incorporation of Certain Documents by Reference” before making an investment decision. You should rely only on the information contained or incorporated by reference in this prospectus, any applicable prospectus supplement and any related free writing prospectus. We have not authorized anyone to provide you with different information. If anyone provides you with additional, different or inconsistent information, you should not rely on it. You should not assume that the information we have included in this prospectus, any applicable prospectus supplement, any related free writing prospectus or any documents incorporated by reference herein or therein is accurate as of any date other than the dates of those documents. Our business, financial condition, results of operations and prospects may have changed since those dates.

This document may only be used where it is legal to sell these securities. This prospectus is not an offer to sell these securities and it is no soliciting an offer to buy these securities in any jurisdiction whether the offer or sale is not permitted.

Unless the context indicates otherwise, as used in this prospectus, the terms “Celsion,” “the Company,” “we,” “us” and “our” refer to Celsion Corporation, a Delaware corporation, and its wholly-owned subsidiary, CLSN Laboratories, Inc., also a Delaware corporation. The Celsion brand and product names, including but not limited to Celsion® and ThermoDox®, contained in this prospectus are trademarks, registered trademarks or service marks of Celsion Corporation or its subsidiary in the United States and certain other countries. This document may also contain references to trademarks and service marks of other companies that are the property of their respective owners.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

We are subject to the information requirements of the Securities Exchange Act of 1934, as amended (Exchange Act). In accordance with the Exchange Act, we file annual, quarterly and current reports, proxy statements and other information with the SEC. Such reports, proxy statements and other information filed by us are available to the public free of charge at www.sec.gov. You may also read and copy any document we file with the SEC at the public reference facilities maintained by the SEC at 100 F Street, N.E., Washington, D.C. 20549. You may obtain information on the operation of the public reference facilities by calling the SEC at 1-800-SEC-0330. Copies of certain information filed by us with the SEC are also available on our website at www.celsion.com. The information available on or through our website is not part of this prospectus or any accompanying prospectus supplement or related free writing prospectus and should not be relied upon.

This prospectus is part of a registration statement that we filed with the SEC. This prospectus omits some information contained in the registration statement in accordance with SEC rules and regulations. You should review the information and exhibits in the registration statement for further information about us and the securities being offered hereby. Statements in this prospectus concerning any document we filed as an exhibit to the registration statement or that we otherwise filed with the SEC are not intended to be comprehensive and are qualified by reference to the filings. You should review the complete document to evaluate these statements.

INFORMATION INCORPORATED BY REFERENCE

The SEC rules allow us to "incorporate by reference" into this prospectus information that we file with the SEC. Incorporation by reference allows us to disclose important information to you by referring you to those publicly available documents. The information that we incorporate by reference into this prospectus is considered to be part of this prospectus. These documents may include Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K, as well as proxy statements. You should read the information incorporated by reference because it is an important part of this prospectus.

This prospectus incorporates by reference the documents listed below, other than those documents or the portions of those documents deemed to be furnished and not filed in accordance with the SEC rules:

- our Annual Report on Form 10-K for the fiscal year ended December 31, 2017 filed with the SEC on March 27, 2018;
- our Quarterly Report on Form 10-Q for the fiscal quarter ended March 31, 2018 filed with the SEC on May 11, 2018 and June 27, 2018;
- our Quarterly Report on Form 10-Q for the fiscal quarter ended June 30, 2018 filed with the SEC on August 14, 2018;
- our Current Reports on Form 8-K filed with the SEC on May 15, 2018, June 28, 2018 and September 4, 2018;
- our Definitive Proxy Statement on Schedule 14A filed with the SEC on March 30, 2018; and
- the description of our common stock contained in our registration statement on Form 8-A filed with the SEC on May 26, 2000, as amended by a Form 8-A/A dated February 7, 2008, and any amendments or reports filed for the purpose of updating such description.

Any statement contained in any 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 in this prospectus or any prospectus supplement 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.

We also incorporate by reference any future filings, other than current reports furnished under Item 2.02 or Item 7.01 of Form 8-K and exhibits filed on such form that are related to such items, made with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act, in each case, other than those documents or the portions of those documents deemed to be furnished and not filed in accordance with SEC rules, until the offering of the securities under the registration statement of which this prospectus forms a part is terminated or completed. Information in such future filings updates and supplements the information provided in this prospectus. Any statements in any such future filings will be deemed to modify and supersede any information in any document we previously filed with the SEC that is incorporated or deemed to be incorporated herein by reference to the extent that statements in the later filed document modify or replace such earlier statements.

Because we are incorporating by reference future filings with the SEC, this prospectus is continually updated and later information filed with the SEC may update and supersede some of the information included or incorporated by reference in this prospectus. This means that you must look at all of the SEC filings that we incorporate by reference to determine if any of the statements in this prospectus or in any document previously incorporated by reference have been modified or superseded.

We will provide without charge to each person, including any beneficial owners, to whom this prospectus is delivered, upon his or her written or oral request, a copy of any or all documents referred to above which have been or may be incorporated by reference into this prospectus but not delivered with this prospectus, excluding exhibits to those documents unless they are specifically incorporated by reference into those documents. You may request a copy of these documents by writing or telephoning us at the following address.

Celsion Corporation

997 Lenox Drive, Suite 100

Lawrenceville, New Jersey 08648

(609) 896-9100

Attention: Jeffrey W. Church

Senior Vice President and Chief Financial Officer

FORWARD-LOOKING STATEMENTS

Certain statements contained or incorporated by reference in this prospectus, in any applicable prospectus and in any related free writing prospectus constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 and releases issued by the SEC and within the meaning of Section 27A of the Securities Act of 1933, as amended (the Securities Act), and Section 21E of the Exchange Act. From time to time, we may publish forward-looking statements relating to such matters as anticipated financial performance, business prospects, technological developments, product pipelines, clinical trials and research and development activities, the adequacy of capital reserves and anticipated operating results and cash expenditures, current and potential collaborations, strategic alternatives and other aspects of our present and future business operations and similar matters that also constitute such forward-looking statements. These statements involve known and unknown risks, uncertainties and other factors that may cause our or our industry's actual results, levels of activity, performance or achievements to be materially different from any future results, levels of activity, performance or achievements expressed or implied by such forward-looking statements. Such statements include, without limitation:

any statements regarding future operations, plans, regulatory filings or approvals, including the plans and objectives of management for future operations or programs or proposed new products or services;

any statements regarding the performance, or likely performance, or outcomes or economic benefit of any of our research and development activities, proposed or potential clinical trials or new drug filing strategies or timelines, including whether any of our clinical trials will be completed successfully within any specified time period or at all;

any projections of earnings, cash resources, revenue, expense or other financial terms;

any statements regarding the initiation, timing, progress and results of our research and development programs, preclinical studies, any clinical trials and Investigational New Drug application, New Drug Application and other regulatory submissions;

any statements regarding cost and timing of development and testing, capital structure, financial condition, working capital needs and other financial items;

any statements regarding the implementation of our business model and integration of acquired technologies, assets or businesses and existing or future collaborations, mergers, acquisitions or other strategic transactions;

any statements regarding approaches to medical treatment, any introduction of new products by others, any possible licenses or acquisitions of other technologies, assets or businesses, or possible actions by customers, suppliers, strategic partners, potential strategic partners, competitors or regulatory authorities;

any statements regarding development or success of our collaboration arrangements or future payments that may come due to us under these arrangements;

any statements regarding compliance with the listing standards of The NASDAQ Capital Market; and any statements regarding future economic conditions or performance and any statement of assumptions underlying any of the foregoing.

In some cases, you can identify forward-looking statements by terminology such as “expect,” “anticipate,” “estimate,” “continue,” “plan,” “believe,” “could,” “intend,” “predict,” “may,” “should,” “will,” “would” and words of similar import rega expectations. Forward-looking statements are only predictions. Actual events or results may differ materially. Although we believe that our expectations are based on reasonable assumptions within the bounds of our knowledge of our industry, business and operations, we cannot guarantee that actual results will not differ materially from our expectations. In evaluating such forward-looking statements, you should specifically consider various factors, including the risks outlined under “Risk Factors” contained in this prospectus and any related free writing prospectus, and in our most recent Annual Report on Form 10-K and our most recent filed Quarterly Reports on Form 10-Q, as well as any amendments thereto reflected in subsequent filings with the SEC. The discussion of risks and uncertainties set forth in those filings is not necessarily a complete or exhaustive list of all risks facing us at any particular point in time. We operate in a highly competitive, highly regulated and rapidly changing environment, and our business is in a state of evolution. Therefore, it is likely that new risks will emerge and the nature and elements of existing risks will change. It is not possible for management to predict all such risk factors or changes therein or to assess either the impact of all such risk factors on our business or the extent to which any individual risk factor, combination of factors or new or altered factors may cause results to differ materially from those contained in any forward-looking statement. Forward-looking statements represent our estimates and assumptions only as of the date such forward-looking statements are made. You should carefully read this prospectus supplement and any related free writing prospectus, together with the information incorporated herein or therein by reference as described under the section titled “Information Incorporated By Reference,” and with the understanding that our actual future results may materially differ from what we expect.

Except as required by law, forward-looking statements speak only as of the date they are made, and we assume no obligation to update any forward-looking statements publicly, or to update the reasons why actual results could differ materially from those anticipated in any forward-looking statements, even if new information becomes available.

PROSPECTUS SUMMARY

The following summary highlights information contained elsewhere or incorporated by reference in this prospectus. This summary does not contain all of the information you should consider before investing in the securities. Before making an investment decision, you should read the entire prospectus carefully, including the matters discussed under the heading "Risk Factors" in this prospectus.

Overview

Celsion is a fully-integrated development stage oncology drug company focused on advancing a portfolio of innovative cancer treatments, including directed chemotherapies, DNA-mediated immunotherapy and RNA based therapies. Our lead product candidate is ThermoDox®, a proprietary heat-activated liposomal encapsulation of doxorubicin, currently in a Phase III clinical trial for the treatment of primary liver cancer (the OPTIMA Study). Second in our pipeline is GEN-1, a DNA-mediated immunotherapy for the localized treatment of ovarian and brain cancers. We have two platform technologies providing the basis for the future development of a range of therapeutics for difficult-to-treat forms of cancer including: Lysolipid Thermally Sensitive Liposomes, a heat sensitive liposomal based dosage form that targets disease with known therapeutics in the presence of mild heat and TheraPlas, a novel nucleic acid-based treatment for local transfection of therapeutic plasmids. With these technologies we are working to develop and commercialize more efficient, effective and targeted oncology therapies that maximize efficacy while minimizing side-effects common to cancer treatments.

ThermoDox®

ThermoDox® is being evaluated in a Phase III clinical trial for primary liver cancer, which we call the OPTIMA Study, which was initiated in 2014 and a Phase II clinical trial for recurrent chest wall breast cancer. ThermoDox® is a liposomal encapsulation of doxorubicin, an approved and frequently used oncology drug for the treatment of a wide range of cancers. Localized heat at hyperthermia temperatures (greater than 40° Celsius) releases the encapsulated doxorubicin from the liposome enabling high concentrations of doxorubicin to be deposited preferentially in and around the targeted tumor.

The OPTIMA Study

The OPTIMA Study represents an evaluation of ThermoDox® in combination with a first line therapy, radio frequency ablation (RFA), for newly diagnosed, intermediate stage HCC patients. HCC incidence globally is approximately 850,000 new cases per year and is the third largest cancer indication globally. Approximately 30% of newly diagnosed patients can be addressed with RFA alone.

On February 24, 2014, we announced that the United States Food and Drug Administration (the “FDA”), after its customary 30-day review period, provided clearance for the OPTIMA Study, which is a pivotal, double-blind, placebo-controlled Phase III trial of ThermoDox®, in combination with standardized RFA, for the treatment of primary liver cancer. The trial design of the OPTIMA Study is based on the comprehensive analysis of data from an earlier clinical trial called the HEAT Study, which is described below. The OPTIMA Study is supported by a hypothesis developed from an overall survival analysis of a large subgroup of patients from the HEAT Study.

We initiated the OPTIMA Study in 2014. The OPTIMA Study was designed with extensive input from globally recognized hepatocellular carcinoma (“HCC”) researchers and expert clinicians and after receiving formal written consultation from the FDA. The OPTIMA Study is expected to enroll up to 550 patients globally at up to 70 sites in the United States, Canada, Europe Union, China and other countries in the Asia-Pacific region, and will evaluate ThermoDox® in combination with standardized RFA, which will require a minimum of 45 minutes across all investigators and clinical sites for treating lesions three to seven centimeters, versus standardized RFA alone. The primary endpoint for this clinical trial is overall survival (“OS”), and the secondary endpoints are progression free survival and safety. The statistical plan calls for two interim efficacy analyses by an independent Data Monitoring Committee (DMC).

On December 16, 2015, we announced that we had received the clinical trial application approval from the China Food and Drug Administration (the “CFDA”) to conduct the OPTIMA Study in China. This clinical trial application approval will allow Celsion to enroll patients at up to 20 clinical sites in China. On April 26, 2016, we announced that the first patient in China had been enrolled in the OPTIMA Study. Results from the OPTIMA Study, if successful, will provide the basis for a global registration filing and marketing approval.

On April 9, 2018, the Company announced that the DMC for the Company's OPTIMA Study completed its last regularly scheduled review of the patients enrolled in the trial and has unanimously recommended that the OPTIMA Study continue according to protocol to its final data readout. The DMC's recommendation was based on the its assessment of safety and data integrity of the first 75% of patients randomized in the trial as of February 5, 2018. The DMC reviewed study data at regular intervals, with the primary responsibilities of ensuring the safety of all patients enrolled in the study, the quality of the data collected, and the continued scientific validity of the study design. As part of its review of the first 413 patients, the DMC monitored a quality matrix relating to the total clinical data set, confirming the timely collection of data, that all data are current as well as other data collection and quality criteria.

On September 5, 2018, the Company announced that it has reached its enrollment objective of 550 patients in the Phase III OPTIMA Study.

The HEAT Study

On January 31, 2013, the Company announced that the HEAT Study, ThermoDox® in combination with RFA, did not meet the primary endpoint, PFS, of a Phase III clinical trial enrolling 701 patients with primary liver cancer. This determination was made after conferring with the HEAT Study independent DMC, that the HEAT Study did not meet the goal of demonstrating a clinically meaningful improvement in progression free survival. In the trial, ThermoDox® was well-tolerated with no unexpected serious adverse events. Following the announcement of the HEAT Study results, we continued to follow patients for OS, the secondary endpoint of the HEAT Study. We have conducted a comprehensive analysis of the data from the HEAT Study to assess the future strategic value and development strategy for ThermoDox®.

The DIGNITY Study

On December 14, 2015, we announced final data from our ongoing DIGNITY study, which is an open-label, dose-escalating Phase II trial of ThermoDox® in patients with recurrent chest wall breast cancer. The DIGNITY Study was designed to establish a safe therapeutic dose in Phase I, and to demonstrate local control in Phase II, including complete and partial responses, and stable disease as its primary endpoint. The DIGNITY Study was also designed to evaluate kinetics in ThermoDox® produced from more than one manufacturing site. Of the 29 patients enrolled and treated, 21 patients were eligible for evaluation of efficacy. Approximately 62% of evaluable patients experienced a local response, including six complete responses and seven partial responses.

Acquisition of EGEN Assets

On June 20, 2014, we completed the acquisition of substantially all of the assets of EGEN, Inc., an Alabama corporation, which has changed its company name to EGWU, Inc. after the closing of the acquisition (“EGEN”), pursuant to an asset purchase agreement dated as of June 6, 2014, by and between EGEN and Celsion (the “Asset Purchase Agreement”). We acquired all of EGEN’s right, title and interest in and to substantially all of the assets of EGEN, including cash and cash equivalents, patents, trademarks and other intellectual property rights, clinical data, certain contracts, licenses and permits, equipment, furniture, office equipment, furnishings, supplies and other tangible personal property. In addition, CLSN Laboratories assumed certain specified liabilities of EGEN, including the liabilities arising out of the acquired contracts and other assets relating to periods after the closing date. The total purchase price for the asset acquisition is up to $44.4 million, including potential future earnout payments of up to $30.4 million contingent upon achievement of certain earnout milestones set forth in the Asset Purchase Agreement. At the closing, we paid approximately $3.0 million in cash after the expense adjustment and issued 193,728 shares of our common stock to EGEN. The shares of common stock were issued in a private transaction exempt from registration under the Securities Act, pursuant to Section 4(2) thereof. In addition, the Company held back 47,862 shares of common stock issuable to EGEN pending satisfactory resolution of any post-closing adjustments of expenses and EGEN’s indemnification obligations under the EGEN Purchase Agreement (Holdback Shares). These shares were issued on June 16, 2017.

After its review in 2016, management concluded that there was no immediate opportunity to out-license TheraSilence. As a result of this analysis, the earnout payments were adjusted prior to 2017 and are now up to $24.4 million that may become payable, in cash, shares of our common stock or a combination thereof, at our option, upon achievement of two major milestone events as follows:

$12.4 million will become payable upon achieving certain specified development milestones relating to an ovarian cancer study of GEN-1 (formerly known as EGEN-001) to be conducted by us or our subsidiary; and

$12.0 million will become payable upon achieving certain specified development milestones relating to a GEN-1 glioblastoma multiforme brain cancer study to be conducted by us or our subsidiary.

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Our obligations to make the earnout payments will terminate on the seventh anniversary of the closing date. In the acquisition, we purchased GEN-1, a DNA-based immunotherapy for the localized treatment of ovarian and brain cancers, and two platform technologies for the development of treatments for those suffering with difficult-to-treat forms of cancer, novel nucleic acid-based immunotherapies and other anti-cancer DNA or RNA therapies, including TheraPlas and TheraSilence.

GEN-I

In February 2015, we announced that the FDA accepted, without objection, the Phase I dose-escalation clinical trial of GEN-1 in combination with the standard of care in neo-adjuvant ovarian cancer (the OVATION Study). On September 30, 2015, we announced enrollment of the first patient in the OVATION Study. The OVATION Study is designed to (i) to identify a safe, tolerable and potentially therapeutically active dose of GEN-1 by recruiting and maximizing an immune response and (ii) to enroll three to six patients per dose level and will evaluate safety and efficacy and attempt to define an optimal dose for a follow-on Phase I/II study. In addition, the OVATION Study establishes a unique opportunity to assess how cytokine-based compounds such as GEN-1, directly affect ovarian cancer cells and the tumor microenvironment in newly diagnosed patients. The study is designed to characterize the nature of the immune response triggered by GEN-1 at various levels of the patients' immune system, including:

- Infiltration of cancer fighting T-cell lymphocytes into primary tumor and tumor microenvironment including peritoneal cavity, which is the primary site of metastasis of ovarian cancer;
- Changes in local and systemic levels of immuno-stimulatory and immunosuppressive cytokines associated with tumor suppression and growth, respectively; and
- Expression profile of a comprehensive panel of immune related genes in pre-treatment and GEN-1-treated tumor tissue.

We initiated the OVATION Study at four clinical sites at the University of Alabama at Birmingham, Oklahoma University Medical Center, Washington University in St. Louis and the Medical College of Wisconsin. During 2016 and 2017, we announced data from the first fourteen patients in the OVATION Study, who completed treatment.

On October 3, 2017, we announced final clinical and translational research data from the OVATION Study, a Phase Ib dose escalating clinical trial combining GEN-1 with the standard of care for the treatment of newly-diagnosed patients with advanced Stage III/IV ovarian cancer who will undergo neoadjuvant chemotherapy followed by interval debulking surgery.

GEN-1 OVATION II Study.

The Company held an Advisory Board Meeting on September 27, 2017 with the clinical investigators and scientific experts including those from Roswell Park Cancer Institute, Vanderbilt University Medical School, and M.D. Anderson Cancer Center to review and finalize clinical, translational research and safety data from the Phase IB OVATION Study in order to determine the next steps forward for our GEN-1 immunotherapy program.

On November 13, 2017, the Company filed its Phase I/II clinical trial protocol with the U.S. Food and Drug Administration for GEN-1 for the localized treatment of ovarian cancer. The protocol is designed with a single dose escalation phase to 100 mg/m^2 to identify a safe and tolerable dose of GEN-1 while maximizing an immune response. The 12 patient Phase I portion of the study will be followed by a continuation at the selected dose in up to 118 patient randomized Phase II study. GEN-1 has demonstrated positive safety and efficacy data in the recently completed dose escalation Phase IB trial in combination with neoadjuvant chemotherapy.

TheraPlas Technology Platform

TheraPlas is a technology platform for the delivery of DNA and messenger RNA ("mRNA") therapeutics via synthetic non-viral carriers and is capable of providing cell transfection for double-stranded DNA plasmids and large therapeutic RNA segments such as mRNA. There are two components of the TheraPlas system, a plasmid DNA or mRNA payload encoding a therapeutic protein and a delivery system. The delivery system is designed to protect the DNA/RNA from degradation and promote trafficking into cells and through intracellular compartments. We designed the delivery system of TheraPlas by chemically modifying the low molecular weight polymer to improve its gene transfer activity without increasing toxicity. We believe TheraPlas is a viable alternative to current approaches to gene delivery due to several distinguishing characteristics, including enhanced molecular versatility that allows for complex modifications to improve activity and safety.

Technology Development and Licensing Agreements.

Our current efforts and resources are applied on the development and commercialization of cancer drugs including tumor-targeting chemotherapy treatments using focused heat energy in combination with heat-activated drug delivery systems, immunotherapies and RNA-based therapies.

On August 8, 2016, we signed a Technology Transfer, Manufacturing and Commercial Supply Agreement (the “GEN-1 Agreement”) with Zhejiang Hisun Pharmaceutical Co. Ltd. (Hisun) to pursue an expanded partnership for the technology transfer relating to the clinical and commercial manufacture and supply of GEN-1, Celsion’s proprietary gene mediated, IL-12 immunotherapy, for the greater China territory, with the option to expand into other countries in the rest of the world after all necessary regulatory approvals are obtained. The GEN-1 Agreement will help to support supply for both ongoing and planned clinical studies in the United States, and for potential future studies of GEN-1 in China. GEN-1 is currently being evaluated by Celsion in first line ovarian cancer patients.

In June 2012, Celsion and Hisun signed a long-term commercial supply agreement for the production of ThermoDox®. Hisun is one the largest manufacturers of chemotherapy agents globally, including doxorubicin. In July 2013, the ThermoDox® collaboration was expanded to focus on next generation liposomal formulation development with the goal of creating safer, more efficacious versions of marketed cancer chemotherapeutics. During 2015, Hisun successfully completed the manufacture of three registration batches for ThermoDox® and has obtained regulatory approvals to supply ThermoDox® to participating clinical trial sites in all of the countries of South East Asia, Europe and North America, as well as to the European Union countries allowing for early access to ThermoDox®. The future manufacturing of clinical and commercial supplies by Hisun will result in a cost structure allowing Celsion to profitably access all global markets, including third world countries, and help accelerate the Company’s product development program in China for ThermoDox® in primary liver cancer and other approved indications.

Business Strategy

We have not generated and do not expect to generate any revenue from product sales in the next several years, if at all. An element of our business strategy has been to pursue, as resources permit, the research and development of a range of product candidates for a variety of indications. We may also evaluate licensing cancer products from third parties for cancer treatments to expand our current product pipeline. This is intended to allow us to diversify the risks associated with our research and development expenditures. To the extent we are unable to maintain a broad range of product candidates, our dependence on the success of one or a few product candidates would increase and results such as those announced in relation to the HEAT study on January 31, 2013 will have a more significant impact on our financial prospects, financial condition and market value. We may also consider and evaluate strategic alternatives, including investment in, or acquisition of, complementary businesses, technologies or products. As demonstrated by the HEAT Study results, drug research and development is an inherently uncertain process and there is a high risk of failure at every stage prior to approval. The timing and the outcome of clinical results are extremely difficult to predict. The success or failure of any preclinical development and clinical trial can have a disproportionately positive or negative impact on our results of operations, financial condition, prospects and market value.

Our current business strategy includes the possibility of entering into collaborative arrangements with third parties to complete the development and commercialization of our product candidates. In the event that third parties take over the clinical trial process for one or more of our product candidates, the estimated completion date would largely be under the control of that third party rather than us. We cannot forecast with any degree of certainty which proprietary products or indications, if any, will be subject to future collaborative arrangements, in whole or in part, and how such arrangements would affect our development plan or capital requirements. We may also apply for subsidies, grants or government or agency-sponsored studies that could reduce our development costs.

As a result of the uncertainties discussed above, among others, we are unable to estimate the duration and completion costs of our research and development projects or when, if ever, and to what extent we will receive cash inflows from the commercialization and sale of a product. Our inability to complete our research and development projects in a timely manner or to obtain positive results in our clinical trials, as well as any failure to enter into collaborative agreements when appropriate, could significantly increase our capital requirements and could adversely impact our liquidity. While our estimated future capital requirements are uncertain and could increase or decrease as a result of many factors, including the extent to which we choose to advance our research, development and clinical trials or whether we are in a position to pursue manufacturing or commercialization activities, it is clear we will need significant additional capital to develop our product candidates through clinical development, manufacturing and commercialization. We do not know whether we will be able to access additional capital when needed or on terms favorable to us or our stockholders. Our inability to raise additional capital, or to do so on terms reasonably acceptable to us, would jeopardize the future success of our business.

Corporate Information

We were founded in 1982 and are a Delaware corporation. Our shares of common stock trade on The NASDAQ Capital Market under the symbol "CLSN." Our principal executive offices are located at 997 Lenox Drive, Suite 100, Lawrenceville, New Jersey 08648. Our telephone number is (609) 896-9100 and our website is www.celsion.com. The information available on or through our website is not part of or incorporated by reference into, this prospectus and should not be relied upon.

Horizon Loan Agreement

On June 27, 2018, the Company issued warrants (the "Warrants") exercisable for a total of 190,114 shares of common stock to Horizon Technology Finance Corporation ("Horizon") in connection with the loan agreement entered into by and between Celsion and Horizon. The Warrants are immediately exercisable, at a per share exercise price of $2.63, for cash or by net exercise from the date of grant and will expire after ten years from the date of grant.

RISK FACTORS

Investing in our securities involves a high degree of risk. You should carefully consider and evaluate all of the information contained in this prospectus, any accompanying prospectus supplement and in the documents incorporated by reference in this prospectus and any accompanying prospectus supplement before you decide to purchase our securities. In particular, you should carefully consider and evaluate the risks and uncertainties described in “Part I - Item 1A. Risk Factors” of our most recent Annual Report on Form 10-K, as updated by the additional risks and uncertainties set forth in our most recent Quarterly Report on Form 10-Q and in other filings we make with the SEC, as well as the risks and uncertainties described under the heading “Risk Factors” contained in the applicable prospectus supplement or in any other document incorporated by reference into this prospectus. Any of the risks and uncertainties set forth therein could materially and adversely affect our business, results of operations and financial condition, which in turn could materially and adversely affect the trading price or value of our securities. As a result, you could lose all or part of your investment.

USE OF PROCEEDS

Unless otherwise indicated in a prospectus supplement, we currently intend to use the net proceeds from the sale of the securities offered hereby for general corporate purposes, which may include the further research and development, clinical trials, manufacture and commercialization of our lead product candidate, ThermoDox®, and other products, including GEN-1, and to fund research and development of our technologies, working capital, repaying, redeeming or repurchasing debt, capital expenditures and other general corporate purposes. We may also use a portion of the net proceeds to acquire or invest in businesses, products and technologies that are complementary to our own, as well as for capital expenditures. We have not specifically allocated the proceeds to those purposes as of the date of this prospectus. Pending these uses, we expect to invest the net proceeds in short-term, interest-bearing instruments or other investment-grade securities, certificates of deposits or short-term U.S. government securities. The precise amount and timing of the application of proceeds from the sale of securities will depend on our funding requirements and the availability and cost of other funds at the time of sale. Allocation of proceeds of a particular series of securities, or the principal reason for the offering if no allocation has been made, will be described in the applicable prospectus supplement or in any related free writing prospectus.

We will not receive any proceeds from the resale of shares of our common stock by the selling stockholder however, we will receive proceeds of approximately $500,000 if all of the Warrants for which the underlying shares are being registered herein are exercised. We expect to use any proceeds from the exercise of these warrants for capital expenditures, working capital and other general corporate purposes.

DIVIDEND POLICY

We have never declared or paid any cash dividends on our common stock and do not currently anticipate declaring or paying cash dividends on our common stock in the foreseeable future. We currently intend to retain all of our future earnings, if any, to finance operations. Any future determination relating to our dividend policy will be made at the discretion of our board of directors and will depend on a number of factors, including future earnings, capital requirements, financial conditions, future prospects, contractual restrictions and other factors that our board of directors may deem relevant.

GENERAL DESCRIPTION OF SECURITIES

We may offer shares of common or preferred stock, various series of debt securities, warrants or other rights to purchase common stock or preferred stock, or units consisting of combinations of the foregoing, in each case from time to time under this prospectus, together with any applicable prospectus supplement, at prices and on terms to be determined by market conditions at the time of offering. This prospectus provides you with a general description of the securities we may offer. At the time we offer a type or series of securities, we will provide a prospectus supplement describing the specific amounts, prices and other important terms of the securities, including, to the extent applicable:

- designation or classification;
- aggregate principal amount or aggregate offering price;
- voting or other rights;
- rates and times of payment of interest, dividends or other payments;
- original issue discount;
- maturity;
- ranking;
- restrictive covenants;
- redemption, conversion, exercise, exchange, settlement or sinking fund terms, including prices or rates, and any provisions for changes to or adjustments in such prices or rates and in the securities or other property receivable upon conversion, exercise, exchange or settlement;
- any securities exchange or market listing arrangements; and
- important U.S. federal income tax considerations.

This prospectus may not be used to offer or sell securities unless accompanied by a prospectus supplement. The prospectus supplement may add, update or change information contained in this prospectus or in documents incorporated by reference in this prospectus. We urge you to read the prospectus supplement related to any securities being offered.

We may sell the securities directly to or through underwriters, dealers or agents. We and our underwriters, dealers or agents reserve the right to accept or reject all or part of any proposed purchase of securities. If we do offer securities through underwriters or agents, we will include in the applicable prospectus supplement (a) the names of the underwriters or agents and applicable fees, discounts and commissions to be paid to them, (b) details regarding over-allotment options, if any, and (c) net proceeds to us.

The following descriptions are not complete and may not contain all the information you should consider before investing in any securities we may offer hereunder; they are summarized from, and qualified by reference to, our amended and restated certificate of incorporation, bylaws and the other documents referred to in the descriptions, all of which are or will be publicly filed with the SEC, as applicable. See “Where You Can Find More Information.”

DESCRIPTION OF CAPITAL STOCK

General

Our authorized capital stock consists of 112,500,000 shares of common stock, $0.01 par value per share, and 100,000 shares of preferred stock, $0.01 par value per share. As of September 6, 2018, there were 17,911,120 shares of our common stock outstanding and no shares of preferred stock outstanding.

The following summary description of our capital stock is based on the applicable provisions of the Delaware General Corporation Law, as amended (DGCL), the provisions of our certificate of incorporation, as amended (our certificate of incorporation), and our bylaws, as amended (our bylaws). This information is qualified entirely by reference to the applicable provisions of the DGCL, our certificate of incorporation and bylaws. For information on how to obtain copies of our certificate of incorporation and bylaws, which are exhibits to the registration statement of which this prospectus is a part, see the section titled “Where You Can Find Additional Information” in this prospectus.

Common Stock

Holders of common stock to be registered hereunder are entitled to one vote for each share held of record on all matters submitted to a vote of stockholders and do not have cumulative voting rights. Subject to any preferential rights of any outstanding preferred stock, holders of common stock are entitled to receive ratably such dividends, if any, as may be declared from time to time by our board of directors out of funds legally available therefor. In the event of a dissolution, liquidation or winding-up of the Company, holders of common stock are entitled to share ratably in all assets remaining after payment of liabilities and any preferential rights of any outstanding preferred stock.

Holders of common stock have no preemptive or conversion rights or other subscription rights. There are no redemption or sinking fund provisions applicable to our common stock. All outstanding shares of common stock are fully paid and non-assessable. The rights, preferences and privileges of the holders of common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock which may be designated and issued in the future.

Preferred Stock

Pursuant to our certificate of incorporation, our board of directors has the authority, without further action by the stockholders (unless such stockholder action is required by applicable law or NASDAQ rules), to designate and issue shares of preferred stock in one or more series, to establish from time to time the number of shares to be included in each such series, to fix the designations, powers (including voting), privileges, preferences and relative participating, optional or other rights, if any, of the shares of each such series and the qualifications, limitations or restrictions thereof and to increase or decrease the number of shares of any such series, but not below the number of shares of such series then outstanding.

We will fix the designations, powers (including voting), privileges, preferences and relative participating, optional or other rights, if any, of the preferred stock of each series, as well as the qualifications, limitations or restrictions thereof, in the certificate of designation relating to that series. We will file as an exhibit to the registration statement of which this prospectus is a part, or will incorporate by reference from reports that we file with the SEC, the form of any certificate of designation that describes the terms of the series of preferred stock we are offering before the issuance of that series of preferred stock. This description will include:

- the title and stated value;
- the number of shares we are offering;
- the liquidation preference per share;
- the purchase price;
- the dividend rate, period and payment date and method of calculation for dividends;
- whether dividends will be cumulative or non-cumulative and, if cumulative, the date from which dividends will accumulate;

- the procedures for any auction or remarketing, if any;
- the provisions for a sinking fund, if any;
- the provisions for redemption or repurchase, if applicable, and any restrictions on our ability to exercise those redemption and repurchase rights;
- any listing of the preferred stock on any securities exchange or market;
- whether the preferred stock will be convertible into or exchangeable for other securities and, if applicable, the conversion price, or how it will be calculated, and the conversion period;
- voting rights, if any, of the preferred stock;
- preemptive rights, if any;
- restrictions on transfer, sale or other assignment, if any;
- liability as to further calls or to assessment by the Company, if any;
- a discussion of any material United States federal income tax considerations applicable to the preferred stock;
- the relative ranking and preferences of the preferred stock as to dividend rights and rights if we liquidate, dissolve or wind up our affairs;
- any limitations on the issuance of any class or series of preferred stock ranking senior to or on a parity with the series of preferred stock as to dividend rights and rights if we liquidate, dissolve or wind up our affairs; and
- any other specific terms, preferences, rights or limitations of, or restrictions on, the preferred stock.

The DGCL provides that the holders of preferred stock will have the right to vote separately as a class or, in some cases, as a series on an amendment to our certificate of incorporation if the amendment would change the par value or, unless our certificate of incorporation provides otherwise, the number of authorized shares of the class or the powers, preferences or special rights of the class or series so as to adversely affect the class or series, as the case may be. This right is in addition to any voting rights that may be provided in the applicable certificate of designation.

Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of our common stock or other securities. Preferred stock could be issued quickly with terms designed to delay or prevent a change in control of our company or make removal of management more difficult. Additionally, the issuance of preferred stock may have the effect of decreasing the market price of our common stock.

Anti-Takeover Considerations and Special Provisions of Our Certificate of Incorporation, Our Bylaws and the Delaware General Corporation Law

Certificate of Incorporation and Bylaws

A number of provisions of our certificate of incorporation and bylaws concern matters of corporate governance and the rights of our stockholders. Provisions that grant our board of directors the ability to issue shares of preferred stock and to set the voting rights, preferences and other terms thereof may discourage takeover attempts that are not first approved by our board of directors, including takeovers that may be considered by some stockholders to be in their best interests, such as those attempts that might result in a premium over the market price for the shares held by stockholders. Certain provisions could delay or impede the removal of incumbent directors even if such removal would be beneficial to our stockholders, such as the classification of our board of directors and the lack of cumulative voting. Since our board of directors has the power to retain and discharge our officers, these provisions could also make it more difficult for existing stockholders or another party to effect a change in management.

These provisions may have the effect of deterring hostile takeovers or delaying changes in our control or in our management. These provisions are intended to enhance the likelihood of continued stability in the composition of our board of directors and in the policies they implement and to discourage certain types of transactions that may involve an actual or threatened change of our control. These provisions are designed to reduce our vulnerability to an unsolicited acquisition proposal. The provisions also are intended to discourage certain tactics that may be used in proxy fights. However, such provisions could have the effect of discouraging others from making tender offers for our shares and, as a consequence, they also may inhibit fluctuations in the market price of our shares that could result from actual or rumored takeover attempts.

These provisions also could discourage or make more difficult a merger, tender offer or proxy contest, even if they could be favorable to the interests of stockholders, and could potentially depress the market price of our common stock. Our board of directors believes that these provisions are appropriate to protect our interests and the interests of our stockholders.

Classification of Board; No Cumulative Voting. Our certificate of incorporation and bylaws provide for our board of directors to be divided into three classes, with staggered three-year terms. Only one class of directors is elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. Because our stockholders do not have cumulative voting rights, our stockholders representing a majority of the shares of common stock outstanding will be able to elect all of our directors due to be elected at each annual meeting of our stockholders.

Meetings of and Actions by Stockholders. Our bylaws provide that annual meetings of our stockholders may take place at the time and place designated by our board of directors. A special meeting of our stockholders may be called at any time by our board of directors, the chairman of our board of directors or the president. Our bylaws provide that (i) our board of directors can fix separate record dates for determining stockholders entitled to receive notice of a stockholder meeting and for determining stockholders entitled to vote at the meeting; (ii) we may hold a stockholder meeting by means of remote communications; (iii) any stockholder seeking to have the stockholders authorize or take corporate action by written consent shall, by written notice to the secretary of the Company, request that the board fix a record date and the board shall adopt a resolution fixing the record date in all events within ten calendar days after a request is received; and (iv) a written consent of stockholders shall not be effective unless a written consent signed by a sufficient number of stockholders to take such action is received by us within 60 calendar days of the earliest dated written consent received.

Advance Notice Requirements for Stockholder Proposals and Director Nominations. Our bylaws provide that stockholders seeking to bring business before an annual meeting of stockholders or to nominate candidates for election as directors at an annual meeting of stockholders must provide timely notice in writing. To be timely, a stockholder's notice must be delivered to, or mailed and received by, the secretary of the Company at our principal executive offices not later than the close of business on the 90th calendar day, nor earlier than the close of business on the 120th calendar day in advance of the date specified in the Company's proxy statement released to stockholders in connection with the previous year's annual meeting of stockholders. If the date of the annual meeting is more than 30 calendar days before or after such anniversary date, notice by the stockholder to be timely must be so not earlier than the close of business on the 120th calendar day in advance of such date of annual meeting and not later than the close of business on the later of the 90th calendar day in advance of such date of annual meeting or the tenth calendar day following the date on which public announcement of the date of the meeting is made. In no event shall the public announcement of an adjournment or postponement of an annual meeting commence a new time period (or extend any time period) for the giving of an advance notice by any stockholder. Any stockholder that proposes director nominations or other business must be a stockholder of record at the time the advance notice is delivered by such stockholder to us and entitled to vote at the meeting. Our bylaws also specify requirements as to the form and content of a stockholder's notice. These provisions may preclude stockholders from bringing matters before an annual meeting of stockholders or from making nominations for the election of directors at an annual meeting of stockholders. Unless otherwise required by law, any director nomination or other business shall not be made or transacted if the stockholder (or a qualified representative of the stockholder) does not appear at the meeting to present the director nominee or other proposed business.

Filling of Board Vacancies. Our certificate of incorporation and bylaws provide that the authorized size of our board of directors shall be determined by the board by board resolution from time to time and that our board of directors has the exclusive power to fill any vacancies and newly created directorships resulting from any increase in the authorized number of directors and the stockholders do not have the power to fill such vacancies. Vacancies in our board of directors and newly created directorships resulting from any increase in the authorized number of directors on our board of directors may be filled by a majority of the directors remaining in office, even though that number may be less than a quorum of our board of directors, or by a sole remaining director. A director so elected to fill a vacancy shall serve for the remaining term of the predecessor he or she replaced and until his or her successor is elected and has qualified, or until his or her earlier resignation, removal or death.

Amendment of the Certificate of Incorporation. Our certificate of incorporation may be amended, altered, changed or repealed at a meeting of our stockholders entitled to vote thereon by the affirmative vote of a majority of the outstanding stock entitled to vote thereon and a majority of the outstanding stock of each class entitled to vote thereon as a class, in the manner prescribed by the DGCL.

Amendment of the Bylaws. Our bylaws may be amended or repealed, or new bylaws may be adopted, by either our board of directors or the affirmative vote of at least 66 2/3 percent of the voting power of our outstanding shares of capital stock.

Section 203 of the Delaware General Corporation Law

We are subject to Section 203 of the DGCL, which prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years after the date that such stockholder became an interested stockholder, with the following exceptions:

- before such date, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;

- upon completion of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85 percent of the voting stock of the corporation outstanding at the time the transaction began, excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares owned (i) by persons who are directors and also officers and (ii) pursuant to 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; and

- on or after such date, the business combination is approved by the board of directors and authorized at an annual or special meeting of the stockholders, and not by written consent, by the affirmative vote of at least 66 2/3 percent of the outstanding voting stock that is not owned by the interested stockholder.

In general, Section 203 defines a business combination to include the following:

- any merger or consolidation involving the corporation and the interested stockholder;

- any sale, lease, transfer, pledge or other disposition of ten percent or more of the assets of the corporation to or with the interested stockholder;

- subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;

- any transaction involving the corporation that has the effect of increasing the proportionate share of the stock or any class or series of the corporation beneficially owned by the interested stockholder; and

- the receipt by the interested stockholder of the benefit of any loss, advances, guarantees, pledges or other financial benefits by or through the corporation.

In general, Section 203 of the DGCL defines an "interested stockholder" as an entity or person who, together with the entity's or person's affiliates and associates, beneficially owns, or is an affiliate of the corporation and within three years prior to the time of determination of interested stockholder status did own, 15 percent or more of the outstanding voting stock of the corporation.

A Delaware corporation may "opt out" of these provisions with an express provision in its certificate of incorporation. We have not opted out of these provisions, which may as a result, discourage or prevent mergers or other takeover or change of control attempts of us.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is American Stock Transfer & Trust Company, LLC (AST), located at 6201 15th Avenue, Brooklyn, New York 11219. AST's phone number is (800) 937-5449.

NASDAQ Capital Market Listing

Our common stock is listed on The NASDAQ Capital Market under the symbol "CLSN."

DESCRIPTION OF DEBT SECURITIES

We may issue debt securities from time to time, in one or more series, as senior, subordinated or junior subordinated, convertible or non-convertible and secured or unsecured debt. Any senior debt securities will rank equally with any unsubordinated debt. Subordinated debt securities will rank equally with any other subordinated debt of the same ranking we may issue. Convertible debt securities will be convertible into or exchangeable for our common stock or other securities at predetermined conversion rates, and conversion may be mandatory or at the holder’s option.

Debt securities will be issued under one or more indentures-contracts between us and a national banking association or other eligible party acting as trustee. Following is a summary of certain general features of debt securities we may issue; we will describe the particular terms of any debt securities that we may offer in more detail in the applicable prospectus supplement, which may differ from the terms we describe below. You should read the prospectus supplements, any free writing prospectus we may authorize and the indentures, supplemental indentures and forms of debt securities relating to any series of debt securities we may offer.

General. Except as we may otherwise provide in a prospectus supplement, the relevant indenture will provide that debt securities may be issued from time to time in one or more series. The indenture will not limit the amount of debt securities that may be issued thereunder and will provide that the specific terms of any series of debt securities shall be set forth in, or determined pursuant to, an authorizing resolution, an officers’ certificate or a supplemental indenture, if any, relating to such series.

We will describe in each prospectus supplement the following terms relating to any series of debt securities:

- the title or designation;
- whether they will be secured or unsecured, and the terms of any security;
- whether the debt securities will be subject to subordination, and any terms thereof;
- any limit upon the aggregate principal amount;
- the date or dates on which the debt securities may be issued and on which we will pay the principal;
- the interest rate, which may be fixed or variable, or the method for determining the rate, the date interest will begin to accrue, the date or dates interest will be payable and the record dates for interest payment dates or the method for determining them;

the manner in which the amounts of payment of principal of, premium or interest on the debt securities will be determined, if these amounts may be determined by reference to an index based on a currency or currencies other than that in which the debt securities are denominated or designated to be payable or by reference to a commodity, commodity index, stock exchange index or financial index;

the currency of denomination;

if payments of principal of, premium or interest will be made in one or more currencies or currency units other than that or those in which the debt securities are denominated, the manner in which the exchange rate with respect to these payments will be determined;

the place or places where the principal of, premium, and interest will be payable, where debt securities of any series may be presented for registration of transfer, exchange or conversion, and where notices and demands to or upon the Company in respect of the debt securities may be made;

the form of consideration in which principal of, premium or interest will be paid;

the terms and conditions upon which we may redeem the debt securities;

any obligation we have to redeem or purchase the debt securities pursuant to any sinking fund, amortization or analogous provisions or at the option of a holder;

the dates on which and the price or prices at which we will repurchase the debt securities at the option of holders and other detailed terms and provisions of these obligations;

the denominations in which the debt securities will be issued, if other than denominations of $1,000 and any integral multiple thereof;

the portion of principal amount payable upon declaration of acceleration of the maturity date, if other than the principal amount;

whether the debt securities are to be issued at any original issuance discount and the amount of discount with which they may be issued;

whether the debt securities will be issued in certificated or global form and, in such case, the depositary and the terms and conditions, if any, upon which interests in such global security or securities may be exchanged in whole or in part for the individual securities represented thereby;

provisions, if any, for defeasance in whole or in part and any addition or change to provisions related to satisfaction and discharge;

the form of the debt securities;

the terms and conditions upon which convertible debt securities will be convertible or exchangeable into securities or property of the Company or another person, if at all, and any additions or changes, if any, to permit or facilitate the same;

provisions, if any, granting special rights to holders upon the occurrence of specified events;

any restriction or condition on transferability;

any addition or change in the provisions related to compensation and reimbursement of the trustee;

any addition to or change in the events of default described in this prospectus or in the indenture and any change in the acceleration provisions so described;

whether the debt securities will restrict our ability to pay dividends, or will require us to maintain any asset ratios or reserves;

whether we will be restricted from incurring any additional indebtedness;

any addition to or change in the covenants described in this prospectus or in the indenture, including terms of any restrictive covenants; and

any other terms which may modify or delete any provision of the indenture.

We may issue debt securities that provide for an amount less than their stated principal amount to be due and payable upon declaration of acceleration of their maturity pursuant to the terms of the indenture. We will provide you with information on the U.S. federal income tax considerations and other special considerations applicable to any debt securities in the applicable prospectus supplement.

Conversion or Exchange Rights. We will set forth in the prospectus supplement the terms, if any, on which a series of debt securities may be convertible into or exchangeable for our common stock or other securities. We will include provisions as to whether conversion or exchange is mandatory, at the option of the holder or at our option. We may include provisions pursuant to which the number of shares of our common stock or other securities that the holders of debt securities receive would be subject to adjustment.

Consolidation, Merger or Sale; **No Protection in Event of a Change of Control or Highly Leveraged Transaction**. Except as we may otherwise provide in a prospectus supplement, the indenture will provide that we may not merge or consolidate with or into another entity, or sell other than for cash or lease all or substantially all our assets to another entity, or purchase all or substantially all the assets of another entity unless we are the surviving entity or, if we are not the surviving entity, the successor, transferee or lessee entity expressly assumes all of our obligations under the indenture or the debt securities, as appropriate.

Unless we state otherwise in the applicable prospectus supplement, the debt securities will not contain any provisions that may afford holders additional protection in the event we have a change of control or in the event of a highly leveraged transaction (whether or not such transaction results in a change of control), which could adversely affect them.

Events of Default Under the Indenture. Except as we may otherwise provide in a prospectus supplement, the following will be events of default under the indenture with respect to any series of debt securities that we may issue:

- if we fail to pay interest when due and our failure continues for 90 days and the time for payment has not been extended or deferred;
- if we fail to pay the principal, or premium, if any, when due whether by maturity or called for redemption;
- if we fail to pay a sinking fund installment, if any, when due and our failure continues for 30 days;
- if we fail to observe or perform any other covenant relating to the debt securities, other than a covenant specifically relating to and for the benefit of holders of another series of debt securities, and our failure continues for 90 days after we receive written notice from the debenture trustee or holders of not less than a majority in aggregate principal amount of the outstanding series; and
- if specified events of bankruptcy, insolvency or reorganization occur as to the Company.

No event of default with respect to a particular series of debt securities (except as to certain events of bankruptcy, insolvency or reorganization) will necessarily constitute an event of default with respect to any other series. The occurrence of an event of default may constitute an event of default under any bank credit agreements we may have in existence from time to time. In addition, the occurrence of certain events of default or an acceleration under the indenture may constitute an event of default under certain of our other indebtedness outstanding from time to time.

Except as we may otherwise provide in a prospectus supplement, if an event of default with respect to debt securities of any series at the time outstanding occurs and is continuing, then the trustee or the holders of not less than a majority in principal amount of the outstanding series may, by a notice in writing to us (and to the debenture trustee if given by the holders), declare to be due and payable immediately the principal (or, if the debt securities are discount securities, that portion of the principal amount as may be specified in the terms of such securities) of and premium and accrued and unpaid interest, if any, on all such debt securities. Before a judgment or decree for payment of the money due has been obtained with respect to any series, the holders of a majority in principal amount of that series (or, at a meeting of holders at which a quorum is present, the holders of a majority in principal amount represented at such meeting) may rescind and annul the acceleration if all events of default, other than the non-payment of accelerated principal, premium, if any, and interest, if any, have been cured or waived as provided in the applicable indenture (including payments or deposits in respect of principal, premium or interest that had become due other than as a result of such acceleration) and the Company has deposited with the indenture trustee or paying agent a sum sufficient to pay all amounts owed to the indenture trustee under the indenture, all arrears of interest, if any, and the principal and premium, if any, on the debt securities that have become due other than by such acceleration. We refer you to the relevant prospectus supplement relating to any discount securities for the particular provisions relating to acceleration of a portion of the principal amount thereof upon the occurrence of an event of default.

Subject to the terms of the indenture, and except as we may otherwise provide in a prospectus supplement, if an event of default under the indenture shall occur and be continuing, the debenture trustee will be under no obligation to exercise any of its rights or powers under such indenture at the request or direction of any of the holders of the applicable series, unless such holders have offered the debenture trustee reasonable indemnity. The holders of a majority in principal amount of any series will have the right to direct the time, method and place of conducting any proceeding for any remedy available to the debenture trustee, or exercising any trust or power conferred on the debenture trustee, with respect to that series, provided that, subject to the terms of the indenture, the debenture trustee need not take any action that it believes, upon the advice of counsel, might involve it in personal liability or might be unduly prejudicial to holders not involved in the proceeding.

Except as we may otherwise provide in a prospectus supplement, a holder of the debt securities of any series will only have the right to institute a proceeding under the indenture or to appoint a receiver or trustee, or to seek other remedies if:

- the holder previously has given written notice to the debenture trustee of a continuing event of default with respect to that series;

- the holders of at least a majority in aggregate principal amount outstanding of that series have made written request, and such holders have offered reasonable indemnity to the debenture trustee to institute the proceeding as trustee; and

- the debenture trustee does not institute the proceeding and does not receive from the holders of a majority in aggregate principal amount outstanding of that series (or at a meeting of holders at which a quorum is present, the holders of a majority in principal amount of such series represented at such meeting) other conflicting directions within 60 days after the notice, request and offer.

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Except as we may otherwise provide in a prospectus supplement, these limitations will not apply to a suit instituted by a holder of debt securities if we default in the payment of the principal, premium, if any, or interest on, them.

We will periodically file statements with the applicable debenture trustee regarding our compliance with specified covenants in the applicable indenture.

Modification of Indenture; Waiver. Except as we may otherwise provide in a prospectus supplement, the debenture trustee and the Company may, without the consent of any holders, execute a supplemental indenture to change the applicable indenture with respect to specific matters, including, among other things:

- to surrender any right or power conferred upon the Company;
- to provide, change or eliminate any restrictions on payment of principal of or premium, if any; provided that any such action shall not adversely affect the interests of the holders of debt securities of any series in any material respect;
- to change or eliminate any of the provisions of the indenture; provided that any such change or elimination shall become effective only when there is no outstanding debt security created prior to the execution of such supplemental indenture that is entitled to the benefit of such provision and as to which such supplemental indenture would apply;
- to evidence the succession of another entity to the Company;
- to evidence and provide for the acceptance of appointment by a successor trustee with respect to one or more series of debt securities and to add or change provisions of the indenture to facilitate the administration of the trusts thereunder by more than one trustee;
- to cure any ambiguity, mistake, manifest error, omission, defect or inconsistency in the indenture or to conform the text of any provision in the indenture or in any supplemental indenture to any description thereof in the applicable section of a prospectus, prospectus supplement or other offering document that was intended to be a verbatim recitation of a provision of the indenture or of any supplemental indenture;
- to add to or change or eliminate any provision of the indenture as shall be necessary or desirable in accordance with any amendments to the U.S. Trust Indenture Act of 1939;
- to make any change in any series of debt securities that does not adversely affect in any material respect the interests of the holders thereof; and
- to supplement any of the provisions of the indenture to such extent as shall be necessary to permit or facilitate the defeasance and discharge of any series of debt securities; provided that any such action shall not adversely affect the interests of holders of any debt securities.

In addition, and except as we may otherwise provide in a prospectus supplement, under the indenture the rights of holders of a series of debt securities may be changed by us and the debenture trustee with the written consent of the holders of at least a majority in aggregate principal amount outstanding (or, at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount represented at such meeting) that is affected. The debenture trustee and the Company may, however, make the following changes only with the consent of each holder of any outstanding debt securities affected:

- extending the fixed maturity;
- reducing the principal amount, reducing the rate of or extending the time of payment of interest, or any premium payable upon redemption;
- reducing the principal amount of discount securities payable upon acceleration of maturity;
- making the principal of or premium or interest payable in currency other than that stated;
- impairing the right to institute suit for the enforcement of any payment on or after the fixed maturity date;
- materially adversely affecting the economic terms of any right to convert or exchange; and
- reducing the percentage of debt securities, the holders of which are required to consent to any amendment or waiver; or modifying, without the written consent of the trustee, the rights, duties or immunities of the trustee.

Except for certain specified provisions, and except as we may otherwise provide in a prospectus supplement, the holders of at least a majority in principal amount of any series (or, at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount represented at such meeting) may, on behalf of the holders of all debt securities of that series, waive our compliance with provisions of the indenture. The holders of a majority in principal amount of the outstanding debt securities of any series may, on behalf of all such holders, waive any past default under the indenture with respect to that series and its consequences, other than a default in the payment of the principal of, premium or any interest; provided, however, that the holders of a majority in principal amount of the outstanding debt securities of any series may rescind an acceleration and its consequences, including any related payment default that resulted from the acceleration.

Discharge. Except as we may otherwise provide in a prospectus supplement, the indenture will provide that we can elect to be discharged from our obligations with respect to one or more series of debt securities. In order to exercise our rights to be discharged, we must deposit with the trustee money or government obligations sufficient to pay all the principal of, the premium, if any, and interest on, the debt securities of the affected series on the dates payments are due.

Form, Exchange and Transfer. Except as we may otherwise provide in a prospectus supplement, we will issue debt securities only in fully registered form without coupons and, unless we otherwise specify in the applicable prospectus supplement, in denominations of $1,000 and any integral multiple thereof. Except as we may otherwise provide in a prospectus supplement, the indenture will provide that we may issue debt securities in temporary or permanent global form and as book-entry securities that will be deposited with a depositary named by us and identified in a prospectus supplement with respect to that series.

At the option of the holder, subject to the terms of the indenture and the limitations applicable to global securities described in the applicable prospectus supplement, the holder will be able to exchange the debt securities for other debt securities of the same series, in any authorized denomination and of like tenor and aggregate principal amount.

Subject to the terms of the indenture and the limitations applicable to global securities set forth in the applicable prospectus supplement, holders may present the debt securities for exchange or for registration of transfer, duly endorsed or with the form of transfer endorsed thereon duly executed if so required by us or the security registrar, at the office of the security registrar or at the office of any transfer agent designated by us for this purpose. Unless otherwise provided in the debt securities or the indenture, we will make no service charge for any registration of transfer or exchange, but we may require payment of any taxes or other governmental charges.

We will name in the applicable prospectus supplement the security registrar, and any transfer agent in addition to the security registrar, that we initially designate for any debt securities. We may at any time designate additional transfer agents or rescind the designation of any transfer agent or approve a change in the office through which any transfer agent acts, except that we will be required to maintain a transfer agent in each place of payment for the debt securities of each series.

Except as we may otherwise provide in a prospectus supplement, if we elect to redeem the debt securities of any series, we will not be required to:

- issue, register the transfer of, or exchange any debt securities of that series during a period beginning at the opening of business 15 days before the day of mailing of a notice of redemption of any debt securities that may be selected for redemption and ending at the close of business on the day of the mailing; or

- register the transfer of or exchange any debt securities so selected for redemption, in whole or in part, except the unredeemed portion of any debt securities we are redeeming in part.

Information Concerning the Debenture Trustee. The debenture trustee, other than during the occurrence and continuance of an event of default under the indenture, will undertake to perform only those duties as are specifically set forth in the indenture. Upon an event of default, the debenture trustee must use the same degree of care as a prudent person would exercise or use in the conduct of his or her own affairs. Subject to this provision, the debenture trustee will be under no obligation to exercise any of the powers given it by the indenture at the request of any holder unless it is offered reasonable security and indemnity against the costs, expenses and liabilities that it might incur.

Payment and Paying Agents. Unless we otherwise indicate in the applicable prospectus supplement, we will make payment of interest on any interest payment date to the person in whose name the debt securities, or one or more predecessor securities, are registered at the close of business on the regular record date for the interest.

Unless we otherwise indicate in the applicable prospectus supplement, we will pay principal of and any premium and interest at the office of the indenture trustee or, at the option of the Company, by check payable to the holder. Unless we otherwise indicate in a prospectus supplement, we will designate the corporate trust office of the debenture trustee our sole paying agent for payments. We will name in the applicable prospectus supplement any other paying agents that we initially designate. We will maintain a paying agent in each place of payment.

All money we pay to a paying agent or the debenture trustee for the payment of principal or any premium or interest which remains unclaimed at the end of two years after such principal, premium or interest has become due and payable will be repaid to us, and the holder of the security thereafter may look only to us for payment thereof.

Governing Law. The indenture and the debt securities will be governed and construed in accordance with the laws of the State of New York.

No Personal Liability of Directors, Officers, Employees and Stockholders. No incorporator, stockholder, employee, agent, officer, director or subsidiary of ours will have any liability for any obligations of ours or, due to the creation of any indebtedness under the debt securities, the indentures or supplemental indentures. The indentures provide that all such liability is expressly waived and released as a condition of, and as consideration for, the execution of such indentures and the issuance of the debt securities.

DESCRIPTION OF WARRANTS, OTHER RIGHTS AND UNITS

We may from time to time issue warrants or other rights (together, Rights), in one or more series, for the purchase of common stock or preferred stock. We may issue Rights independently or together with such securities, and such Rights may be attached to or separate from them. Rights will be evidenced by a Rights certificate issued under one or more Rights agreements between us and a Rights agent which will act solely as our agent in connection with the Rights and will not have any obligation or relationship of agency or trust for or with any holders or beneficial owners of Rights. We may issue securities in units (Units), each consisting of two or more types of securities. For example, we might issue Units consisting of a combination of common stock and warrants to purchase common stock. If we issue Units, the prospectus supplement relating to the Units will contain the information described above with regard to each of the securities that is a component of the Units. In addition, the prospectus supplement relating to the Units will describe the terms of any Units we issue. The forms of any such certificates and agreements will be filed as exhibits to the registration statement of which this prospectus is a part by amendment thereof or as exhibits to a Current Report on Form 8-K incorporated herein by reference, and the accompanying prospectus supplement and such forms may add, update or change the terms and conditions of the Rights or Units described in this prospectus. You should read the prospectus supplements, Rights agreements and Rights certificates that contain the terms of the Rights in their entirety.

The particular terms of each issue of Rights or Units will be described in the applicable prospectus supplement, including, as applicable:

- the title of the Rights or Units;
- any initial offering price;
- the title, aggregate principal amount or number and terms of the securities purchasable upon exercise of the Rights;
- the principal amount or number of securities purchasable upon exercise of each Right and the price at which that principal amount or number may be purchased upon exercise of each Right;
- the currency or currency units in which any offering price and any exercise price are payable;
- the title and terms of any related securities with which the Rights are issued and the number of the Rights issued with each security;
- any date on and after which the Rights or Units and the related securities will be separately transferable;
- any minimum or maximum number of Rights that may be exercised at any one time;
- the date on which the right to exercise the Rights will commence and the date on which the right will expire;

a discussion of U.S. federal income tax, accounting or other considerations applicable to the Rights or Units;

whether the Rights represented by the Rights certificates, if applicable, will be issued in registered or bearer form and, if registered, where they may be transferred and registered;

any anti-dilution provisions of the Rights or Units;

any redemption or call provisions applicable to the Rights;

any provisions for changes to or adjustments in the exercise price of any Rights; and

any additional terms of the Rights or Units, including terms, procedures and limitations relating to exchange and exercise of the Rights or Units.

Rights certificates will be exchangeable for new Rights certificates of different denominations and, if in registered form, may be presented for registration of transfer, and Rights may be exercised, at the corporate trust office of the Rights agent or any other office indicated in the related prospectus supplement. Before the exercise of Rights, holders of Rights will not be entitled to payments of any dividends, principal, premium or interest on securities purchasable upon exercise of the Rights, to vote, consent or receive any notice as a holder of and in respect of any such securities or to enforce any covenants in any indenture, or to exercise any other rights whatsoever as a holder of securities purchasable upon exercise of the Rights.

SELLING STOCKHOLDER

This prospectus covers an aggregate of up to 190,114 shares of our common stock that may be sold or otherwise disposed of by the selling stockholder. Such shares are issuable to the selling stockholder upon the exercise of the Warrants we issued to the selling stockholder.

The following table sets forth certain information with respect to the selling stockholder, including (i) the shares of our common stock beneficially owned by the selling stockholder prior to this offering, (ii) the number of shares being offered by the selling stockholder pursuant to this prospectus and (iii) the selling stockholder's beneficial ownership after completion of this offering, assuming that all of the shares covered hereby (but none of the other shares, if any, held by the selling stockholder) are sold.

The table is based on information supplied to us by the selling stockholder, with beneficial ownership and percentage ownership determined in accordance with the rules and regulations of the SEC and includes voting or investment power with respect to shares of stock. This information does not necessarily indicate beneficial ownership for any other purpose. In computing the number of shares beneficially owned by a selling stockholder and the percentage ownership of that selling stockholder, shares of common stock subject to warrants held by that selling stockholder that are exercisable as of September 6, 2018, or exercisable within 60 days after September 6, 2018, are deemed outstanding. Such shares, however, are not deemed outstanding for the purposes of computing the percentage ownership of any other person. The percentage of beneficial ownership after this offering is based on 17,911,120 shares outstanding on September 6, 2018.

The registration of these shares of common stock does not mean that the selling stockholder will sell or otherwise dispose of all or any of those securities. The selling stockholder may sell or otherwise dispose of all, a portion or none of such shares from time to time. We do not know the number of shares, if any, that will be offered for sale or other disposition by any of the selling stockholder under this prospectus. Furthermore, the selling stockholder may have sold, transferred or disposed of the shares of common stock covered hereby in transactions exempt from the registration requirements of the Securities Act since the date on which we filed this prospectus.

To our knowledge and except as noted below, the selling stockholder has not, or within the past three years has not, any position, office or other material relationship with us or any of our predecessors or affiliates

	Beneficial Ownership	Beneficial Ownership After This Offering

Selling Stockholder[1]	Before This Offering Number of Shares Owned	Shares Offered Hereby	Shares Underlying Warrants Offered Hereby[3]	Number of Shares Owned	Percentage of Outstanding Shares
Horizon Technology Finance Corporation (2)	-	-	190,114	-	-

(1) This table and the information in the notes below are based upon information supplied by the selling stockholder, including reports and amendments thereto filed with the SEC on Schedule 13G.

(2) The address of the principal business office of Horizon Technology Finance Corporation is 312 Farmington Avenue, Farmington, CT 06032.

(3) The actual number of shares of common stock offered hereby and included in the registration statement of which this prospectus forms a part includes, in accordance with Rule 416 under the Securities Act, such indeterminate number of additional shares of our common stock as may become issuable in connection with any proportionate adjustment for any stock splits, stock combinations, stock dividends, recapitalizations or similar events with respect to common stock.

We could be adversely affected by any violations of the FCPA, the U.K. Bribery Act, and other foreign anti-bribery laws.

The FCPA generally prohibits companies and their intermediaries from making improper payments to non-U.S. government officials for the purpose of obtaining or retaining business. Other countries in which we operate also have anti-bribery laws, some of which prohibit improper payments to government and non-government persons and entities, and others (e.g., the FCPA and the U.K. Bribery Act) extend their application to activities outside of their country of origin. Our policies mandate compliance with all applicable anti-bribery laws. We currently operate in, and may further expand into, key parts of the world that have experienced governmental corruption to some degree and, in certain circumstances, strict compliance with anti-bribery laws may conflict with local customs and practices. In addition, due to the level of regulation in our industry, our operations in certain jurisdictions, including China, India, South America, and the Middle East, require substantial government contact, either directly by us or through intermediaries over whom we have less direct control, such as subcontractors, agents, and partners (such as joint venture partners), where norms can differ from U.S. standards. Although we have implemented policies, procedures, and, in certain cases, contractual arrangements designed to facilitate compliance with these anti-bribery laws, our officers, directors, associates, subcontractors, agents, and partners may take actions in violation of our policies, procedures, contractual arrangements, and anti-bribery laws. Any such violation, even if prohibited by our policies, could subject us and such persons to criminal and/or civil penalties or other sanctions potentially by government prosecutors from more than one country, which could have a material adverse effect on our business, financial condition, cash flows, and reputation.

Environmental obligations and liabilities could have a substantial negative impact on our business, financial condition, and results of operations.

Our operations involve the use, handling, generation, processing, storage, transportation, and disposal of hazardous materials and are subject to extensive environmental laws and regulations at the national, state, local, and international levels. These environmental laws and regulations include those governing the discharge of pollutants into the air and water, the use, management, and disposal of hazardous materials and wastes, the cleanup of contaminated sites, and occupational health and safety. As we expand our business into foreign jurisdictions worldwide, our environmental compliance burden may continue to increase both in terms of magnitude and complexity. We have incurred and may continue to incur significant costs 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 subject to substantial fines, penalties, criminal proceedings, third-party property damage or personal injury claims, cleanup costs, or other costs. Such solutions could also result in substantial delay or termination of projects under construction within our systems business, which could adversely impact our results of operations. While we believe we are currently in substantial compliance with applicable environmental requirements, 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 may require expenditures that could have a material adverse effect on our business, financial condition, and results of operations.

Our solar modules contain CdTe and other semiconductor materials. Elemental cadmium and certain of its compounds are regulated as hazardous materials due to the adverse health effects that may arise from human exposure. Based on existing research, the risks of exposure to CdTe are not believed to be as serious as those relating to exposure to elemental cadmium. In our manufacturing operations, we maintain engineering controls to minimize our associates' exposure to cadmium or cadmium compounds and require our associates who handle cadmium compounds to follow certain safety

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procedures, including the use of personal protective equipment such as respirators, chemical goggles, and protective clothing. Relevant studies and third-party peer review of our technology have concluded that the risk of exposure to cadmium or cadmium compounds from our end-products is negligible. In addition, the risk of exposure is further minimized by the encapsulated nature of these materials in our products, the physical properties of cadmium compounds used in our products, and the recycling or responsible disposal of our modules. While we believe that these factors and procedures are sufficient to protect our associates, end-users, and the general public from adverse health effects that may arise from cadmium exposure, we cannot ensure that human or environmental exposure to cadmium or cadmium compounds used in our products will not occur. Any such exposure could result in future third-party claims against us, damage to our reputation, and heightened regulatory scrutiny, which could limit or impair our ability to sell and distribute our products. The occurrence of future events such as these could have a material adverse effect on our business, financial condition, and results of operations.

The use of cadmium or cadmium compounds in various products is also coming under increasingly stringent governmental regulation. Future regulation in this area could impact the manufacturing, sale, collection, and recycling of solar modules and could require us to make unforeseen environmental expenditures or limit our ability to sell and distribute our products. For example, European Union Directive 2011/65/EU on the Restriction of the Use of Hazardous Substances ("RoHS") in electrical and electronic equipment (the "RoHS Directive") restricts the use of certain hazardous substances, including cadmium and its compounds, in specified products. Other jurisdictions, such as China, have adopted similar legislation or are considering doing so. Currently, PV solar modules are explicitly excluded from the scope of RoHS (Article 2), as adopted by the European Parliament and the Council in June 2011. The next general review of the RoHS Directive is scheduled for 2021, involving a broader discussion of the existing scope. A scope review focusing on additional exclusions was proposed by the European Commission in 2017 under the EU's co-decision process which allows the European Parliament and the European Council to amend the European Commission's proposal on exclusions. The co-decision procedure was completed in 2017 and the existing exclusion of PV modules was maintained. In preparation for the next RoHS revision, the European Commission has started a number of pre-regulatory studies and assessments relating to the addition of new substances to the existing RoHS framework, as well as the revision and optimization of the exemption process. It is unclear to what extent the existing scope exclusions will be discussed or maintained in future directives. If PV modules were to be included in the scope of future RoHS revisions without an exemption or exclusion, we would be required to redesign our solar modules to reduce cadmium and other affected hazardous substances to the maximum allowable concentration thresholds in the RoHS Directive in order to continue to offer them for sale within the EU. As such actions would be impractical, this type of regulatory development would effectively close the EU market to us, which could have a material adverse effect on our business, financial condition, and results of operations.

As an owner and operator of PV solar power systems that deliver electricity to the grid, certain of our affiliated entities may be regulated as public utilities under U.S. federal and state law, which could adversely affect the cost of doing business and limit our growth.

As an owner and operator of PV solar power systems that deliver electricity to the grid, certain of our affiliated entities may be considered public utilities for purposes of the Federal Power Act, as amended (the "FPA"), and public utility companies for purposes of the Public Utility Holding Company Act of 2005 ("PUHCA 2005"), and are subject to regulation by the FERC, as well as various local and state regulatory bodies. Some of our affiliated entities may be exempt wholesale generators or qualifying facilities under the Public Utility Regulatory Policies Act of 1978, as amended ("PURPA"), and as such are exempt from regulation under PUHCA 2005. In addition, our affiliated entities may be exempt from most provisions of the FPA, as well as state laws regarding the financial or organizational regulation of public utilities. We are not directly subject to FERC regulation under the FPA. However, we are considered to be a "holding company" for purposes of Section 203 of the FPA, which regulates certain transactions involving public utilities, and such regulation could adversely affect our ability to grow the business through acquisitions. Likewise, investors seeking to acquire our public utility subsidiaries or acquire ownership interests in our securities sufficient to give them control over us and our public utility subsidiaries may require prior FERC approval to do so. Such approval could result in transaction delays or uncertainties.

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Public utilities under the FPA are required to obtain FERC acceptance of their rate schedules for wholesale sales of electricity and to comply with various regulations. The FERC may grant our affiliated entities the authority to sell electricity at market-based rates and may also grant them certain regulatory waivers, such as waivers from compliance with FERC's accounting regulations. These FERC orders reserve the right to revoke or revise market-based sales authority if the FERC subsequently determines that our affiliated entities can exercise market power in the sale of generation products, the provision of transmission services, or if it finds that any of the entities can create barriers to entry by competitors. In addition, if the entities fail to comply with certain reporting obligations, the FERC may revoke their power sales tariffs. Finally, if the entities were deemed to have engaged in manipulative or deceptive practices concerning their power sales transactions, they would be subject to potential fines, disgorgement of profits, and/or suspension or revocation of their market-based rate authority. If our affiliated entities were to lose their market-based rate authority, such companies would be required to obtain the FERC's acceptance of a cost-of-service rate schedule and could become subject to the accounting, record-keeping, and reporting requirements that are imposed on utilities with cost-based rate schedules, which would impose cost and compliance burdens on us and have an adverse effect on our results of operations. In addition to the risks described above, we may be subject to additional regulatory regimes at state or foreign levels to the extent we own and operate PV solar power systems in such jurisdictions.

Other Risks

We are subject to litigation risks, including securities class actions and stockholder derivative actions, which may be costly to defend and the outcome of which is uncertain.

From time to time, we are subject to legal claims, with and without merit, that may be costly and which may divert the attention of our management and our resources in general. In addition, our projects may be subject to litigation or other adverse proceedings that may adversely impact our ability to proceed with construction or sell a given project. The results of complex legal proceedings are difficult to predict. Moreover, many of the complaints filed against us do not specify the amount of damages that plaintiffs seek, and we therefore are unable to estimate the possible range of damages that might be incurred should these lawsuits be resolved against us. Certain of these lawsuits assert types of claims that, if resolved against us, could give rise to substantial damages, and an unfavorable outcome or settlement of one or more of these lawsuits, or any future lawsuits, may result in a significant monetary judgment or award against us or a significant monetary payment by us, and could have a material adverse effect on our business, financial condition, or results of operations. Even if these lawsuits, or any future lawsuits, are not resolved against us, the costs of defending such lawsuits and of any settlement may be significant. These costs may exceed the dollar limits of our insurance policies or may not be covered at all by our insurance policies. Because the price of our common stock has been, and may continue to be, volatile, we can provide no assurance that additional securities or other litigation will not be filed against us in the future. See Note 15. "Commitments and Contingencies – Legal Proceedings" to our consolidated financial statements for more information on our legal proceedings, including our securities class action and derivative actions.

We may not realize the anticipated benefits of past or future business combinations or acquisition transactions, and integration of business combinations may disrupt our business and management.

We have made several acquisitions in prior years and in the future we may acquire additional companies, project pipelines, products, or technologies or enter into joint ventures or other strategic initiatives. We may not realize the anticipated benefits of such business combinations or acquisitions, and each transaction has numerous risks, which may include the following:

- difficulty in assimilating the operations and personnel of the acquired or partner company;

- difficulty in effectively integrating the acquired products or technologies with our current products or technologies;
- difficulty in achieving profitable commercial scale from acquired technologies;

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- difficulty in maintaining controls, procedures, and policies during the transition and integration;
- disruption of our ongoing business and distraction of our management and associates from other opportunities and challenges due to integration issues;
- difficulty integrating the acquired or partner company's accounting, management information, and other administrative systems;
- difficulty managing joint ventures with our partners, potential litigation with joint venture partners, and reliance upon joint ventures that we do not control;
- inability to retain key technical and managerial personnel of the acquired business;
- inability to retain key customers, vendors, and other business partners of the acquired business;
- inability to achieve the financial and strategic goals for the acquired and combined businesses, as a result of insufficient capital resources or otherwise;
- incurring acquisition-related costs or amortization costs for acquired intangible assets that could impact our operating results;
- potential impairment of our relationships with our associates, customers, partners, distributors, or third-party providers of products or technologies;
- potential failure of the due diligence processes to identify significant issues with product quality, legal and financial liabilities, among other things;
- potential inability to assert that internal controls over financial reporting are effective;
- potential inability to obtain, or obtain in a timely manner, approvals from governmental authorities, which could delay or prevent such acquisitions; and
- potential delay in customer purchasing decisions due to uncertainty about the direction of our product offerings.

Mergers and acquisitions of companies are inherently risky, and ultimately, if we do not complete the integration of acquired businesses successfully and in a timely manner, we may not realize the anticipated benefits of the acquisitions to the extent anticipated, which could adversely affect our business, financial condition, or results of operations. In addition, we may seek to dispose of our interests in acquired companies, project pipelines, products, or technologies. We may not recover our initial investment in such interests, in part or at all, which could adversely affect our business, financial condition, or results of operations.

Our future success depends on our ability to retain our key associates and to successfully integrate them into our management team.

We are dependent on the services of our executive officers and other members of our senior management team. The loss of one or more of these key associates or any other member of our senior management team could have a material adverse effect on our business. We may not be able to retain or replace these key associates and may not have adequate succession plans in place. Several of our current key associates including our executive officers are subject to employment conditions or arrangements that contain post-employment non-competition provisions. However, these arrangements permit the associates to terminate their employment with us upon little or no notice.

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If we are unable to attract, train, and retain key personnel, our business may be materially and adversely affected.

Our future success depends, to a significant extent, on our ability to attract, train, and retain management, operations, sales, training, and technical personnel, including personnel in foreign jurisdictions. Recruiting and retaining capable personnel, particularly those with expertise in the PV solar industry across a variety of technologies, are vital to our success. There is substantial competition for qualified technical personnel, and while we continue to benchmark our organization against the broad spectrum of business in our market space to remain economically competitive, there can be no assurances that we will be able to attract and retain our technical personnel. If we are unable to attract and retain qualified associates, or otherwise experience unexpected labor disruptions within our business, we may be materially and adversely affected.

We may be exposed to infringement or misappropriation claims by third parties, which, if determined adversely to us, could cause us to pay significant damage awards or prohibit us from the manufacture and sale of our solar modules or the use of our technology.

Our success depends largely on our ability to use and develop our technology and know-how without infringing or misappropriating the intellectual property rights of third parties. The validity and scope of claims relating to PV solar technology patents involve complex scientific, legal, and factual considerations and analysis and, therefore, may be highly uncertain. We may be subject to litigation involving claims of patent infringement or violation of intellectual property rights of third parties. The defense and prosecution of intellectual property suits, patent opposition proceedings, and related legal and administrative proceedings can be both costly and time consuming and may significantly divert the efforts and resources of our technical and management personnel. An adverse determination in any such litigation or proceedings to which we may become a party could subject us to significant liability to third parties, require us to seek licenses from third parties, which may not be available on reasonable terms, or at all, or pay ongoing royalties, require us to redesign our solar modules, or subject us to injunctions prohibiting the manufacture and sale of our solar modules or the use of our technologies. Protracted litigation could also result in our customers or potential customers deferring or limiting their purchase or use of our solar modules until the resolution of such litigation.

Currency translation and transaction risk may negatively affect our results of operations.

Although our reporting currency is the U.S. dollar, we conduct certain business and incur costs in the local currency of most countries in which we operate. As a result, we are subject to currency translation and transaction risk. For example, certain of our net sales in 2018 were denominated in foreign currencies, such as Japanese yen and Indian rupees, and we expect to continue to have net sales denominated in foreign currencies in the future. Joint ventures or other business arrangements with strategic partners outside of the United States have involved, and in the future may involve, significant investments denominated in local currencies. Changes in exchange rates between foreign currencies and the U.S. dollar could affect our results of operations and result in exchange gains or losses. We cannot accurately predict the impact of future exchange rate fluctuations on our results of operations.

We could also expand our business into emerging markets, many of which have an uncertain regulatory environment relating to currency policy. Conducting business in such emerging markets could cause our exposure to changes in exchange rates to increase, due to the relatively high volatility associated with emerging market currencies and potentially longer payment terms for our proceeds.

Our ability to hedge foreign currency exposure is dependent on our credit profile with the banks that are willing and able to do business with us. Deterioration in our credit position or a significant tightening of the credit market conditions could limit our ability to hedge our foreign currency exposures; and therefore, result in exchange gains or losses.

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Our largest stockholder has significant influence over us and his interests may conflict with or differ from interests of other stockholders.

Our largest stockholder, Lukas T. Walton (the “Significant Stockholder”), owned approximately 21% of our outstanding common stock as of December 31, 2018. As a result, the Significant Stockholder has substantial influence over all matters requiring stockholder approval, including the election of our directors and the approval of significant corporate transactions such as mergers, tender offers, and the sale of all or substantially all of our assets. The interests of the Significant Stockholder could conflict with or differ from interests of other stockholders. For example, the concentration of ownership held by the Significant Stockholder could delay, defer, or prevent a change of control of our company or impede a merger, takeover, or other business combination, which other stockholders may view favorably.

If our long-lived assets or project related assets become impaired, we may be required to record significant charges to earnings.

We may be required to record significant charges to earnings should we determine that our long-lived assets or project related assets are impaired. Such charges may have a material impact on our financial position and results of operations. We review long-lived and project related assets for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. We consider a project commercially viable or recoverable if it is anticipated to be sold for a profit once it is either fully developed or fully constructed or if the expected operating cash flows from future power generation exceed the cost basis of the asset. If our projects are not considered commercially viable, we would be required to impair the respective assets.

Unanticipated changes in our tax provision, the enactment of new tax legislation, or exposure to additional income tax liabilities could affect our profitability.

We are subject to income taxes in the jurisdictions in which we operate. In December 2017, the United States enacted the Tax Act. The changes included in the Tax Act are broad and complex, and the final effects of the Tax Act may differ from the amounts provided elsewhere in this Annual Report on Form 10-K, possibly materially, due to, among other things, changes in regulations related to the Tax Act, any legislative action to address questions that arise because of the Tax Act, any changes in accounting standards for income taxes or related interpretations in response to the Tax Act, or actions we may take as a result of the Tax Act. Additionally, longstanding international tax laws that determine each country’s jurisdictional tax rights in cross-border international trade continue to evolve as a result of the base erosion and profit shifting reporting requirements recommended by the OECD. As these and other tax laws and regulations change, our business, financial condition, and results of operations could be adversely affected.

We are subject to potential tax examinations in various jurisdictions, and taxing authorities may disagree with our interpretations of U.S. and foreign tax laws and may assess additional taxes. We regularly assess the likely outcomes of these examinations in order to determine the appropriateness of our tax provision; however, the outcome of tax examinations cannot be predicted with certainty. Therefore, the amounts ultimately paid upon resolution of such examinations could be materially different from the amounts previously included in our income tax provision, which could have a material impact on our results of operations and cash flows.

In addition, our future effective tax rate could be adversely affected by changes to our operating structure, losses of tax holidays, changes in the jurisdictional mix of earnings among countries with tax holidays or differing statutory tax rates, changes in the valuation of deferred tax assets and liabilities, changes in tax laws, and the discovery of new information in the course of our tax return preparation process. Any changes in our effective tax rate may materially and adversely impact our results of operations.

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Cyber-attacks or other breaches of our information systems, or those of third parties with which we do business, could have a material adverse effect on our business, financial condition, and results of operations.

Our operations rely on our computer systems, hardware, software, and networks, as well as those of third parties with which we do business, to securely process, store, and transmit proprietary, confidential, and other information, including intellectual property. We also rely heavily on these information systems to operate our manufacturing lines and PV solar power plants. These information systems may be compromised by cyber-attacks, computer viruses, and other events that could be materially disruptive to our business operations and could put the security of our information, and that of the third parties with which we do business, at risk of misappropriation or destruction. In recent years, such cyber incidents have become increasingly frequent and sophisticated, targeting or otherwise affecting a wide range of companies. While we have instituted security measures to minimize the likelihood and impact of a cyber incident, there is no assurance that these measures, or those of the third parties with which we do business, will be adequate in the future. If these measures fail, valuable information may be lost; our manufacturing, development, construction, O&M, and other operations may be disrupted; we may be unable to fulfill our customer obligations; and our reputation may suffer. For example, any cyber incident affecting our automated manufacturing lines could adversely affect our ability to produce solar modules or otherwise affect the quality and performance of the modules produced. We may also be subject to litigation, regulatory action, remedial expenses, and financial losses beyond the scope or limits of our insurance coverage. These consequences of a failure of security measures could, individually or in the aggregate, have a material adverse effect on our business, financial condition, and results of operations.

Changes in, or any failure to comply with, privacy laws, regulations, and standards may adversely affect our business.

Personal privacy and data security have become significant issues in the United States, Europe, and in many other jurisdictions in which we operate. The regulatory framework for privacy and security issues worldwide is rapidly evolving and is likely to remain uncertain for the foreseeable future. Furthermore, federal, state, or foreign government bodies or agencies have in the past adopted, and may in the future adopt, laws and regulations affecting data privacy, all of which may be subject to invalidation by relevant foreign judicial bodies. Industry organizations also regularly adopt and advocate for new standards in this area.

In the United States, these include rules and regulations promulgated or pending under the authority of federal agencies, state attorneys general, legislatures, and consumer protection agencies. Internationally, many jurisdictions in which we operate have established their own data security and privacy legal framework with which we, relevant suppliers, and customers must comply. For example, the General Data Protection Regulation, a broad-based data privacy regime enacted by the European Parliament, which became effective in May 2018, imposes new requirements on how we collect, process, transfer, and store personal data, and also imposes additional obligations, potential penalties, and risk upon our business. In many jurisdictions, enforcement actions and consequences for noncompliance are also rising. In addition to government regulation, privacy advocates and industry groups may propose new and different self-regulatory standards that either legally or contractually apply to us. Although we have implemented policies, procedures, and, in certain cases, contractual arrangements designed to facilitate compliance with applicable privacy and data security laws and standards, any inability or perceived inability to adequately address privacy and security concerns, even if unfounded, or comply with applicable privacy and data security laws, regulations, and policies, could result in additional fines, costs, and liabilities to us, damage our reputation, inhibit sales, and adversely affect our business.

Our credit agreements contain covenant restrictions that may limit our ability to operate our business.

We may be unable to respond to changes in business and economic conditions, engage in transactions that might otherwise be beneficial to us, and obtain additional financing, if needed, because the senior secured credit facility made available under our amended and restated credit agreement with several financial institutions as lenders and JPMorgan Chase Bank, N.A. as administrative agent (the “Revolving Credit Facility”) and certain of our project financing arrangements contain, and other future debt agreements may contain, covenant restrictions that limit our ability to, among other things:

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- incur additional debt, assume obligations in connection with letters of credit, or issue guarantees;
- create liens;
- enter into certain transactions with our affiliates;
- sell certain assets; and
- declare or pay dividends, make other distributions to stockholders, or make other restricted payments.

Under our Revolving Credit Facility and certain of our project financing arrangements, we are also subject to certain financial covenants. Our ability to comply with covenants under our credit agreements is dependent on our future performance or the performance of specifically financed projects, which will be subject to many factors, some of which are beyond our control, including prevailing economic conditions. In addition, our failure to comply with these covenants could result in a default under these agreements and any of our other future debt agreements, which if not cured or waived, could permit the holders thereof to accelerate such debt and could cause cross-defaults under our other facility agreements and the possible acceleration of debt under such agreements, as well as cross-defaults under certain of our key project and operational agreements and could also result in requirements to post additional security instruments to secure future obligations. In addition, certain events that occur within the Company, or in the industry or the economy as a whole, may constitute material adverse effects under these agreements. If it is determined that a material adverse effect has occurred, the lenders can, under certain circumstances, restrict future borrowings or accelerate the due date of outstanding amounts. If any of our debt is accelerated, we may not have sufficient funds available to repay such debt and may experience cross-defaults under our other debt or operational agreements, which could materially and adversely affect our business, financial condition, and results of operations.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

As of December 31, 2018, our principal properties consisted of the following:

Nature	Primary Segment(s) Using Property	Location	Held
Corporate headquarters	Modules & Systems	Tempe, Arizona, United States	Lease
Manufacturing plant, R&D facility, and administrative offices (1)	Modules	Perrysburg, Ohio, United States	Own
Administrative offices	Systems	San Francisco, California, United States	Lease
R&D facility	Modules & Systems	Santa Clara, California, United States	Lease
Manufacturing plant and administrative offices	Modules	Kulim, Kedah, Malaysia	Lease land, own buildings
Administrative offices	Modules & Systems	Georgetown, Penang, Malaysia	Lease
Manufacturing plant	Modules	Ho Chi Minh City, Vietnam	Lease land, own buildings
Manufacturing plant (2)	Modules	Frankfurt/Oder, Germany	Own

(1) Includes our manufacturing plant located in Lake Township, Ohio, a short distance from our plant in Perrysburg, Ohio.

(2) In December 2012, we ceased manufacturing at our German plant. Since its closure, we have continued to market such property for sale.

In addition, we lease small amounts of office and warehouse space in several other U.S. and international locations.

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Item 3. Legal Proceedings

See Note 15. "Commitments and Contingencies – Legal Proceedings" to our consolidated financial statements for information regarding legal proceedings and related matters.

Item 4. Mine Safety Disclosures

None.

PART II

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

Market Information

Our common stock is listed on The Nasdaq Stock Market LLC under the symbol FSLR.

Holders

As of February 15, 2019, there were 48 record holders of our common stock, which does not reflect beneficial owners of our shares.

Dividend Policy

We have never paid and do not expect to pay dividends on our common stock for the foreseeable future. Furthermore, our Revolving Credit Facility imposes restrictions on our ability to declare or pay dividends. The declaration and payment of dividends is subject to the discretion of our board of directors and depends on various factors, including our net income, financial condition, cash requirements, and future prospects as well as the restrictions under our Revolving Credit Facility and other factors considered relevant by our board of directors. We expect to prioritize our working capital requirements, capacity expansion and other capital expenditure needs, project development and construction, and merger and acquisition opportunities prior to returning capital to our shareholders.

Stock Price Performance Graph

The following graph compares the five-year cumulative total return on our common stock relative to the cumulative total returns of the S&P 500 Index and the Invesco Solar ETF, which represents a peer group of solar companies. In the stock price performance graph included below, an investment of $100 (with reinvestment of all dividends) is assumed to have been made in our common stock, the S&P 500 Index, and the Invesco Solar ETF on December 31, 2013, and its relative performance is tracked through December 31, 2018. This performance graph is not "soliciting material," is not deemed filed with the SEC, and is not to be incorporated by reference in any filing by us under the Securities Act or the Exchange Act, whether made before or after the date hereof, and irrespective of any general incorporation language in any such filing. The stock price performance shown on the graph represents past performance and should not be considered an indication of future price performance.

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COMPARISON OF FIVE-YEAR CUMULATIVE TOTAL RETURN*
Among First Solar, the S&P 500 Index,
and the Invesco Solar ETF**

* $100 invested on December 31, 2013 in stock or index, including reinvestment of dividends. Index calculated on a month-end basis.

** In May 2018, the Guggenheim Solar ETF was reorganized into the Invesco Solar ETF subsequent to Invesco Ltd.'s acquisition of Guggenheim Capital LLC's exchange-traded funds business. The ticker symbol and index did not change as a result of the reorganization.

Recent Sales of Unregistered Securities

None.

Purchases of Equity Securities by the Issuer and Affiliate Purchases

None.

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Item 6. Selected Financial Data

The following tables set forth our selected financial data for the periods and at the dates indicated. The selected financial data from the consolidated statements of operations and consolidated statements of cash flows for the years ended December 31, 2018, 2017, and 2016 and the selected financial data from the consolidated balance sheets as of December 31, 2018 and 2017 have been derived from the audited consolidated financial statements included in this Annual Report on Form 10-K. The selected financial data from the consolidated statements of operations and consolidated statements of cash flows for the years ended December 31, 2015 and 2014 and the selected financial data from the consolidated balance sheets as of December 31, 2016, 2015, and 2014 have been derived from audited consolidated financial statements not included in this Annual Report on Form 10-K. The information presented below should also be read in conjunction with our consolidated financial statements and the related notes thereto and Item 7. "Management's Discussion and Analysis of Financial Condition and Results of Operations."

	Years Ended December 31,				
	2018	2017	2016	2015	2014
	(In thousands, except per share amounts)				
Net sales	$2,244,044	$2,941,324	$2,904,563	$4,112,650	$3,391,187
Gross profit	392,177	548,947	638,418	1,132,762	824,941
Operating income (loss)	40,113	177,851	(568,151)	730,159	421,999
Net income (loss)	144,326	(165,615)	(416,112)	593,406	395,964
Net income (loss) per share:					
Basic	$1.38	$(1.59)	$(4.05)	$5.88	$3.96
Diluted	$1.36	$(1.59)	$(4.05)	$5.83	$3.90
Cash dividends declared per common share	$—	$—	$—	$—	$—
Net cash (used in) provided by operating activities	$(326,809)	$1,340,677	$206,753	$(325,209)	$735,516
Net cash (used in) provided by investing activities	(682,714)	(626,802)	144,520	(156,177)	(387,818)
Net cash provided by (used in) financing activities	255,228	192,045	(136,393)	101,207	(46,907)

	December 31,				
	2018	2017	2016	2015	2014
	(In thousands)				
Cash and cash equivalents	$1,403,562	$2,268,534	$1,347,155	$1,126,826	$1,482,054
Marketable securities	1,143,704	720,379	607,991	703,454	509,032
Total assets	7,121,362	6,864,501	6,824,368	7,360,392	6,720,991
Total long-term debt	466,791	393,540	188,388	289,415	213,473
Total liabilities	1,908,959	1,765,804	1,606,019	1,741,996	1,729,504
Total stockholders' equity	5,212,403	5,098,697	5,218,349	5,618,396	4,991,487

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

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our consolidated financial statements and the related notes thereto included in this Annual Report on Form 10-K. In addition to historical financial information, the following discussion and analysis contains forward-looking statements that involve risks, uncertainties, and assumptions as described under the "Note Regarding Forward-Looking Statements" that appears earlier in this Annual Report on Form 10-K. Our actual results could differ materially from those anticipated by these forward-looking statements as a result of many factors, including those discussed under Item 1A. "Risk Factors," and elsewhere in this Annual Report on Form 10-K.

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Executive Overview

We are a leading global provider of comprehensive PV solar energy solutions. We design, manufacture, and sell PV solar modules with an advanced thin film semiconductor technology and also develop, design, construct, and sell PV solar power systems that primarily use the modules we manufacture. Additionally, we provide O&M services to system owners. We have substantial, ongoing R&D efforts focused on module and system-level innovations. We are the world's largest thin film PV solar module manufacturer and one of the world's largest PV solar module manufacturers.

Certain of our financial results and other key operational developments for the year ended December 31, 2018 include the following:

- Net sales for 2018 decreased by 24% to $2.2 billion compared to $2.9 billion in 2017. The decrease in net sales was primarily attributable to the sale of the Moapa and Switch Station projects in 2017, which were substantially complete when we entered into the associated sales contracts with the customers, the sale of the California Flats project in 2017 relative to revenue recognized on the project in 2018 from ongoing construction activities, and a decrease in third-party module sales, partially offset by the sale of the Willow Springs, Rosamond, Mashiko, Manildra, and certain India projects in 2018, and the completion of substantially all construction activities on the Balm Solar, Payne Creek, and Grange Hall projects in 2018.

- Gross profit decreased 1.2 percentage points to 17.5% during 2018 from 18.7% during 2017 primarily due to higher under-utilization and certain other charges associated with the initial ramp of Series 6 manufacturing lines and a reduction to our product warranty liability in 2017 due to lower legacy module replacement costs, partially offset by the mix of higher gross profit projects sold during the period and the settlement of a tax examination with the state of California, which affected our estimates of sales and use taxes due for certain projects.

- During 2018, we commenced commercial production of Series 6 modules at our manufacturing facilities in Perrysburg, Ohio; Kulim, Malaysia; and Ho Chi Minh City, Vietnam, bringing our total installed annual nameplate production capacity across all our facilities to 5.0 GW_{DC}. In early 2019, we commenced commercial production at our second manufacturing facility in Ho Chi Minh City, Vietnam.

- We produced 2.7 GW_{DC} of solar modules during 2018, which represented an 18% increase from 2017. The increase in production was primarily driven by the incremental Series 6 production capacity added in 2018, partially offset by the ramp down of certain Series 4 production lines. We expect to produce between 5.2 GW_{DC} and 5.5 GW_{DC} of solar modules during 2019, including approximately 2 GW_{DC} of Series 4 modules.

Market Overview

The solar industry continues to be characterized by intense pricing competition, both at the module and system levels. In particular, module average selling prices in global markets have experienced an accelerated decline in recent years and are expected to continue to decline to some degree in the future. In the aggregate, we believe manufacturers of solar cells and modules have significant installed production capacity, relative to global demand, and the ability for additional capacity expansion. We believe the solar industry may from time to time experience periods of structural imbalance between supply and demand (i.e., where production capacity exceeds global demand), and that such periods will continue to put pressure on pricing. We believe the solar industry is currently in such a period, due in part to recent developments in China, which include feed-in-tariff reductions causing deferment of in-country project development. Additionally, intense competition at the system level may result in an environment in which pricing falls rapidly, thereby further increasing demand for solar energy solutions but constraining the ability for project developers, EPC companies, and vertically-integrated companies such as First Solar to sustain meaningful and consistent profitability. In light of such market realities, we are focusing on our strategies and points of differentiation, which include our advanced module and system technologies, our manufacturing process, our vertically-integrated business model, our financial viability, and the sustainability advantage of our modules and systems.

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Global solar markets continue to expand and develop, in part aided by demand elasticity resulting from declining industry average selling prices, both at the module and system levels, which make solar energy more affordable. We are developing, constructing, and operating multiple solar projects around the world as we continue to execute on our advanced-stage utility-scale project pipeline. We expect a significant portion of our future consolidated net sales, operating income, and cash flows to be derived from such projects. We also continue to develop our early-to-mid-stage project pipeline and evaluate acquisitions of projects to further expand both our early-to-mid-stage and advanced-stage pipelines. See the tables under “Management’s Discussion and Analysis of Financial Condition and Results of Operations – Systems Project Pipeline” for additional information about projects within our advanced-stage pipeline.

Lower industry module and system pricing, which presents challenges for certain module manufacturers (particularly manufacturers with higher cost structures), is expected to continue to contribute to diversification in global electricity generation and further demand for solar energy solutions. Over time, we believe that solar energy generation will experience widespread adoption as it competes economically with traditional forms of energy generation. In the near term, however, declining average selling prices are expected to adversely affect our results of operations. If competitors reduce pricing to levels below their costs; bid aggressively low prices for module sale agreements, EPC agreements, and PPAs; or are able to operate at minimal or negative operating margins for sustained periods of time, our results of operations could be further adversely affected. In certain markets in California and elsewhere, an oversupply imbalance at the grid level may further reduce short-to-medium term demand for new solar installations relative to prior years, lower PPA pricing, and lower margins on module and system sales to such markets. However, the effects of such imbalance can be mitigated by modern solar power plants that offer a flexible operating profile, thereby promoting greater grid stability and enabling a higher penetration of solar energy. We continue to mitigate these uncertainties in part by executing on our module technology improvements, including our transition to Series 6 module manufacturing, continuing the development of key markets, partnering with grid operators and utility companies, and implementing certain other cost reduction initiatives, including both manufacturing, BoS, and other operating costs.

We face intense competition from manufacturers of crystalline silicon solar modules and developers of solar power projects. Solar module manufacturers compete with one another on price and on several module value attributes, including wattage (or conversion efficiency), energy yield, and reliability, and developers of systems compete on various factors such as net present value, return on equity, and LCOE, meaning the net present value of a system’s total life cycle costs divided by the quantity of energy that is expected to be produced over the system’s life. Many crystalline silicon cell and wafer manufacturers continue to transition from lower efficiency BSF multi-crystalline cells (the legacy technology against which we have generally competed in our markets) to higher efficiency PERC multi-crystalline and mono-crystalline cells at competitive cost structures. Additionally, while conventional solar modules, including the solar modules we produce, are monofacial, meaning their ability to produce energy is a function of direct and diffuse irradiance on their front side, certain manufacturers of mono-crystalline PERC modules are pursuing the commercialization of bifacial modules that also capture diffuse irradiance on the back side of a module. We believe the cost effective manufacture of bifacial PERC modules is being enabled, in part, by the expansion of inexpensive crystal growth and diamond wire saw capacity in China. Bifaciality compromises nameplate efficiency, but by converting both front and rear side irradiance, such technology may improve the overall energy production of a module relative to nameplate efficiency when applied in certain applications, which, after considering the incremental BoS costs, could potentially lower the overall LCOE of a system when compared to systems using conventional solar modules, including the modules we produce.

We believe we are among the lowest cost module manufacturers in the solar industry on a module cost per watt basis, based on publicly available information. This cost competitiveness allows us to compete favorably in markets where pricing for modules and fully integrated PV solar power systems is highly competitive. Our cost competitiveness is based in large part on our module conversion efficiency, proprietary manufacturing technology (which enables us to produce a CdTe module in less than 3.5 hours using a continuous and highly automated industrial manufacturing process, as opposed to a batch process), and our focus on operational excellence. In addition, our CdTe modules use approximately 1-2% of the amount of semiconductor material that is used to manufacture conventional crystalline silicon solar modules. The cost of polysilicon is a significant driver of the manufacturing cost of crystalline silicon solar modules, and the timing and rate of change in the cost of silicon feedstock and polysilicon could lead to changes in solar module pricing levels. Polysilicon costs have declined in recent years, and polysilicon consumption per cell has been reduced through various initiatives, such as the adoption of diamond wire saw technology, contributing to a decline in our relative manufacturing cost competitiveness over conventional crystalline silicon module manufacturers.

Given the smaller size (sometimes referred to as form factor) of our Series 4 modules compared to certain types of crystalline silicon modules, we may incur higher labor and BoS costs associated with the construction of systems using our Series 4 modules. Thus, to compete effectively on an LCOE basis, our Series 4 modules may need to maintain a certain cost advantage per watt compared to crystalline silicon-based modules with larger form factors. Our next generation Series 6 modules have a larger form factor along with better product attributes and a lower manufacturing cost structure. Accordingly, the larger form factor and design of our Series 6 modules is expected to reduce the number of electrical connections, hardware, and labor required for system installation compared to current module technologies, including our Series 4 modules. The resulting cost savings are expected to improve project returns as BoS and labor costs represent a significant portion of the overall costs associated with the construction of a typical utility-scale system.

In terms of energy yield, in many climates, our CdTe modules provide a significant energy production advantage over most conventional crystalline silicon solar modules (including BSF and PERC technologies) of equivalent efficiency rating. For example, our CdTe solar modules provide a superior temperature coefficient, which results in stronger system performance in typical high insolation climates as the majority of a system's generation, on average, occurs when module temperatures are well above 25°C (standard test conditions). In addition, our CdTe modules provide a superior spectral response in humid environments where atmospheric moisture alters the solar spectrum relative to laboratory standards. Our CdTe solar modules also provide a better shading response than conventional crystalline silicon solar modules, which may lose up to three times as much power as CdTe solar modules when shading occurs. As a result of these and other factors, our PV solar power systems typically produce more annual energy in real world field conditions than competing systems with the same nameplate capacity.

While our modules and systems are generally competitive in cost, reliability, and performance attributes, there can be no guarantee such competitiveness will continue to exist in the future to the same extent or at all. Any declines in the competitiveness of our products could result in additional margin compression, further declines in the average selling prices of our modules and systems, erosion in our market share for modules and systems, and/or declines in overall net sales. We continue to focus on enhancing the competitiveness of our solar modules and systems by accelerating progress along our module technology and cost reduction roadmaps, continuing to make technological advances at the system level, using innovative installation techniques and know-how, and leveraging volume procurement around standardized hardware platforms.

Certain Trends and Uncertainties

We believe that our operations may be favorably or unfavorably impacted by the following trends and uncertainties that may affect our financial condition and results of operations. See Item 1A. "Risk Factors" and elsewhere in this Annual Report on Form 10-K for a discussion of other risks that may affect our financial condition and results of operations.

Our long-term strategic plans are focused on our goal to create long-term shareholder value through a balance of growth, profitability, and liquidity. In executing such plans, we are focusing on providing utility-scale PV solar energy solutions using our modules in key geographic markets that we believe have a compelling need for mass-scale PV electricity, including markets throughout the Americas, the Asia-Pacific region, Europe, and certain other strategic markets. Additionally, we are focusing on opportunities in which our PV solar energy solutions can compete directly with traditional forms of energy generation on an LCOE or similar basis, or complement such generation offerings. Our focus on our core module and utility-scale offerings exists within a current market environment that includes rooftop and distributed generation solar, particularly in the United States. While it is unclear how rooftop and distributed generation solar might impact our core utility-scale based offerings in the next several years, we believe that utility-scale solar will continue to be a compelling solar offering for companies with technology and cost leadership and will continue to represent an increasing portion of the overall electricity generation mix. Additionally, our ability to provide

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utility-scale offerings on economically attractive terms depends, in part, on certain market factors outside of our control, such as interest rate fluctuations, domestic or international trade policies, and government support programs. Adverse changes in these factors could increase the cost of utility-scale systems, which could reduce demand for such systems and limit the number of potential buyers.

We are closely evaluating and managing the appropriate level of resources required as we pursue the most advantageous and cost effective projects and partnerships in our key markets. We have dedicated, and intend to continue to dedicate, significant capital and human resources to reduce the total installed cost of PV solar energy, to optimize the design and logistics around our PV solar energy solutions, and to ensure that our solutions integrate well into the overall electricity ecosystem of each specific market. We expect that, over time, the majority of our consolidated net sales, operating income, and cash flows will come from solar offerings in the key geographic markets described above. The timing, execution, and financial impacts of our long-term strategic plans are subject to risks and uncertainties, as described in Item 1A. “Risk Factors,” and elsewhere in this Annual Report on Form 10-K. We are focusing our resources in those markets and energy applications in which solar power can be a least-cost, best-fit energy solution, particularly in regions with significant current or projected electricity demand, relatively high existing electricity prices, strong demand for renewable energy generation, and high solar resources.

Creating or maintaining a market position in certain strategically targeted markets and energy applications also requires us to adapt to new and changing market conditions. For example, our offerings from time to time may need to be competitively priced at levels associated with minimal gross profit margins, which may adversely affect our results of operations. We expect the profitability associated with our various sales offerings to vary from one another over time, and possibly vary from our internal long-range profitability expectations and targets, depending on the market opportunity and the relative competitiveness of our offerings compared with other energy solutions, traditional or otherwise, that are available to potential customers. In addition, as we execute on our long-term strategic plans, we will continue to monitor and adapt to any changing dynamics in emerging technologies, such as commercially viable energy storage solutions, which are expected to further enable PV solar power systems to compete with traditional forms of energy generation by shifting the delivery of energy generated by such systems to periods of greater demand. Storage solutions continue to evolve in terms of technology and cost, and cumulative global deployments of storage capacity are expected to exceed 900 GW_{DC} by 2040, representing a significant increase in the potential market for renewable energy. We will also continue to monitor and adapt to changing dynamics in the market set of potential buyers of solar projects. Market environments with few potential project buyers and a higher cost of capital would generally exert downward pressure on the potential revenue from the solar projects we are developing, whereas, conversely, market environments with many potential project buyers and a lower cost of capital would likely have a favorable impact on the potential revenue from such solar projects.

On occasion, we may temporarily own and operate certain systems with the intention to sell them at a later date. We may also enter into business arrangements with strategic partners that result in us temporarily retaining an ownership interest in the underlying systems projects we develop, supply modules to, or construct, potentially for a period of up to several years. In these situations, we may retain such ownership interests in a consolidated or unconsolidated separate entity. We may also elect to construct and temporarily retain ownership interests in partially contracted or uncontracted systems for which there is a partial or no PPA with an off-taker, such as a utility, but rather an intent to sell a portion or all of the electricity produced by the system on an open contract basis until the system is sold. Expected revenue from projects without a PPA for the full offtake of the system is subject to greater variability and uncertainty based on market factors and is typically lower than projects with a PPA for the full offtake of the system. Furthermore, all system pricing is effected by the pricing of energy to be sold on an open contract basis following the termination of the PPA (i.e., merchant pricing curves), and changes in market assumptions regarding future open contract sales may also result in significant variability and uncertainty in the value of our systems projects.

We continually evaluate forecasted global demand, competition, and our addressable market and seek to effectively balance manufacturing capacity with market demand and the nature and extent of our competition. During 2018, we commenced commercial production of Series 6 modules at our manufacturing facilities in Perrysburg, Ohio; Kulim, Malaysia; and our previously idled manufacturing plant in Ho Chi Minh City, Vietnam. In early 2019, we commenced

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commercial production at our second manufacturing facility in Ho Chi Minh City, Vietnam. We are also in the process of constructing an additional Series 6 manufacturing plant in Lake Township, Ohio, a short distance from our plant in Perrysburg, Ohio. These additional manufacturing plants, and any other potential investments to add or otherwise modify our existing manufacturing capacity in response to market demand and competition, may require significant internal and possibly external sources of liquidity, and may be subject to certain risks and uncertainties described in Item 1A. "Risk Factors," including those described under the headings "Our future success depends on our ability to effectively balance manufacturing production with market demand, convert existing production facilities to support new product lines, such as our transition to Series 6 module manufacturing, and, when necessary, continue to build new manufacturing plants over time in response to such demand and add production lines in a cost-effective manner, all of which are subject to risks and uncertainties" and "If any future production lines are not built in line with committed schedules, it may adversely affect our future growth plans. If any future production lines do not achieve operating metrics similar to our existing production lines, our solar modules could perform below expectations and cause us to lose customers."

Systems Project Pipeline

The following tables summarize, as of February 21, 2019, our approximately 2.6 GW_{AC} advanced-stage project pipeline. The actual volume of modules installed in our projects will be greater than the project size in MW_{AC} as module volumes required for a project are based upon MW_{DC}, which will be greater than the MW_{AC} size pursuant to a DC-AC ratio typically ranging from 1.2 to 1.3. Such ratio varies across different projects due to various system design factors. Projects are typically removed from our advanced-stage project pipeline tables below once we substantially complete construction of the project and after substantially all of the associated project revenue is recognized. Projects, or portions of projects, may also be removed from the tables below in the event an EPC-contracted or partner-developed project does not obtain permitting or financing, a project is not able to be sold due to the changing economics of the project or other factors, or we decide to temporarily own and operate, or retain interests in, such projects based on strategic opportunities or market factors.

Projects under Sales Agreements
(Includes uncompleted sold projects, projects under sales contracts subject to conditions precedent, and EPC agreements, including partner developed projects that we will be or are constructing.)

Project/Location	Project Size in MW_{AC}	PPA Contracted Partner	EPC Contract/Partner Developed Project	Expected Year Revenue Recognition Will Be Completed	% of Revenue Recognized as of December 31, 2018
Phoebe, Texas	250	Shell Energy North America	Innergix Renewable Energy	2019	12%
GA Solar 4, Georgia (1)	200	Georgia Power Company	Origis Energy USA	2020	11%
Rosamond, California	150	SCE	Clearway Energy Group	2019	57%
Willow Springs, California	100	SCE	D.E. Shaw Renewable Investments	2019	96%
Beryl, Australia	87	(2)	New Energy Solar	2019	—%
Grange Hall, Florida	61	(3)	Tampa Electric Company	2019	98%
Peace Creek, Florida	55	(3)	Tampa Electric Company	2019	70%
Troy Solar, Indiana	51	(3)	Southern Indiana Gas and Electric Company	2020	—%
	50	(3)		2019	34%

Lake Hancock, Florida		Tampa Electric Company
Total	1,004	

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Projects with Executed PPAs Not under Sales Agreements

Project/Location	Project Size in MW_{AC}	PPA Contracted Partner	Fully Permitted	Expected or Actual Substantial Completion Year	% Complete as of December 31, 2018
Muscle Shoals, Alabama	227	Tennessee Valley Authority	No	2021	2%
Little Bear, California	160	Marin Clean Energy	No	2020	5%
Sun Streams, Arizona	150	SCE	Yes	2019	14%
Southwestern U.S.	150	(4)	Yes	2020/2021	4%
Luz del Norte, Chile	141	(5)	Yes	2016	100%
American Kings Solar, California	123	SCE	No	2020	16%
Cove Mountain Solar 2, Utah	122	PacifiCorp	No	2020	1%
Sunshine Valley, Nevada	100	SCE	Yes	2019	4%
Willow Springs 3, California	75	PG&E	Yes	2021	8%
Seabrook, South Carolina	73	South Carolina Electric and Gas Company	No	2019	3%
Sun Streams PVS, Arizona	65	APS	No	2020	2%
Ishikawa, Japan	59	Hokuriku Electric Power Company	Yes	2018	100%
Cove Mountain Solar 1, Utah	58	PacifiCorp	No	2020	1%
Japan (multiple locations)	44	(6)	No	2019/2020	9%
Miyagi, Japan	40	Tohoku Electric Power Company	Yes	2021	17%
India (multiple locations)	40	(7)	Yes	2017	100%
Total	1,627				

(1) Previously known as the Twiggs County Solar project

(2) Approximately 55 MW_{AC} of the plant's capacity is contracted with Transport for NSW

(3) Utility-owned generation

(4) Contracted but not specified

(5) Approximately 70 MW_{AC} of the plant's capacity is contracted under various PPAs

(6) Tokyo Electric Power Company – 27 MW_{AC} and Hokuriku Electric Power Company – 17 MW_{AC}

(7) Gulbarga Electricity Supply Co. – 20 MW_{AC} and Chamundeshwari Electricity Supply Co. – 20 MW_{AC}

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Results of Operations

The following table sets forth our consolidated statements of operations as a percentage of net sales for the years ended December 31, 2018, 2017, and 2016:

	Years Ended December 31,		
	2018	2017	2016
Net sales	100.0 %	100.0 %	100.0 %
Cost of sales	82.5 %	81.3 %	78.0 %
Gross profit	17.5 %	18.7 %	22.0 %
Selling, general and administrative	7.9 %	6.9 %	9.0 %
Research and development	3.8 %	3.0 %	4.3 %
Production start-up	4.0 %	1.4 %	— %
Restructuring and asset impairments	— %	1.3 %	25.6 %
Goodwill impairment	— %	— %	2.6 %
Operating income (loss)	1.8 %	6.0 %	(19.6)%
Foreign currency loss, net	— %	(0.3)%	(0.5)%
Interest income	2.7 %	1.2 %	0.9 %
Interest expense, net	(1.2)%	(0.9)%	(0.7)%
Other income, net	1.8 %	0.8 %	1.4 %
Income tax expense	(0.2)%	(12.6)%	(0.8)%
Equity in earnings, net of tax	1.5 %	0.1 %	5.0 %
Net income (loss)	6.4 %	(5.6)%	(14.3)%

Segment Overview

We operate our business in two segments. Our modules segment involves the design, manufacture, and sale of CdTe solar modules to third parties, and our systems segment includes the development, construction, operation, maintenance, and sale of PV solar power systems, including any modules installed in such systems and any revenue from energy generated by such systems. See Note 22. “Segment and Geographical Information” to our consolidated financial statements for more information on our operating segments. See also Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations – Systems Project Pipeline” for a description of the system projects in our advanced-stage project pipeline.

Net sales

Modules Business

We generally price and sell our solar modules per watt of nameplate power. During 2018, M.A. Mortenson Company, RCR O'Donnell Griffin Pty, Ltd, and Tampa Electric Company each accounted for more than 10% of our modules business net sales, and the majority of our solar modules were sold to integrators and operators of systems in the United States, Australia, and France. Substantially all of our modules business net sales during 2018 were denominated in U.S. dollars. We recognize revenue for module sales at a point in time following the transfer of control of the modules to the customer, which typically occurs upon shipment or delivery depending on the terms of the underlying contracts. The revenue recognition policies for module sales are further described in Note 2. “Summary of Significant Accounting Policies” to our consolidated financial statements.

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Systems Business

During 2018, Tampa Electric Company, Capital Dynamics, Mitsui & Co., D.E. Shaw, and IDFC Alternatives each accounted for more than 10% of our systems business net sales, and the majority of our systems business net sales were in the United States, Japan, and India. Substantially all of our systems business net sales during 2018 were denominated in U.S. dollars, Japanese yen, and Indian rupees. We typically recognize revenue for sales of solar power systems using cost based input methods, which result in revenue being recognized as work is performed based on the relationship between actual costs incurred compared to the total estimated costs for a given contract. We may also recognize revenue for the sale of a system after the project has been completed due to the timing of when we enter into the associated sales contract with the customer. The revenue recognition policies for our systems business are further described in Note 2. "Summary of Significant Accounting Policies" to our consolidated financial statements.

The following table shows net sales by reportable segment for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Modules	$502,001	$806,398	$675,452	$(304,397)	(38)%	$130,946	19 %
Systems	1,742,043	2,134,926	2,229,111	(392,883)	(18)%	(94,185)	(4)%
Net sales	$2,244,044	$2,941,324	$2,904,563	$(697,280)	(24)%	$36,761	1 %

Net sales from our modules segment decreased by $304.4 million in 2018 primarily due to a 34% decrease in the volume of watts sold and a 6% decrease in the average selling price per watt. The decrease in the volume of watts sold in 2018 was driven by our transition to Series 6 manufacturing, which resulted in a temporary reduction in production capacity during the period. Net sales from our systems segment decreased by $392.9 million in 2018 primarily as a result of the sale of the Moapa and Switch Station projects in 2017, which were substantially complete when we entered into the associated sales contracts with the customers, and the sale of the California Flats project in 2017 relative to revenue recognized on the project in 2018 from ongoing construction activities, partially offset by the sale of the Willow Springs, Rosamond, Mashiko, Manildra, and certain India projects in 2018, and the completion of substantially all construction activities on the Balm Solar, Payne Creek, and Grange Hall projects in 2018.

Net sales from our modules segment increased by $130.9 million in 2017 primarily due to a 68% increase in the volume of watts sold, partially offset by a 29% decrease in the average selling price per watt. Net sales from our systems segment decreased by $94.2 million in 2017 primarily as a result of the completion of substantially all construction activities on a number of projects in 2016, including the Desert Stateline, Astoria, Taylor, East Pecos, Silver State South, Butler, and McCoy projects, partially offset by the sale of the Moapa, California Flats, Switch Station, and Cuyama projects in 2017.

Cost of sales

Modules Business

Our modules business cost of sales includes the cost of raw materials and components for manufacturing solar modules, such as glass, transparent conductive coatings, CdTe and other thin film semiconductors, laminate materials, connector assemblies, edge seal materials, and frames. In addition, our cost of sales includes direct labor for the manufacturing of solar modules and manufacturing overhead, such as engineering, equipment maintenance, quality and production control, and information technology. Our cost of sales also includes depreciation of manufacturing plant and equipment, facility-related expenses, environmental health and safety costs, and costs associated with shipping, warranties, and solar module collection and recycling (excluding accretion).

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Systems Business

For our systems business, project-related costs include development costs (legal, consulting, transmission upgrade, interconnection, permitting, and other similar costs), EPC costs (consisting primarily of solar modules, inverters, electrical and mounting hardware, project management and engineering, and construction labor), and site specific costs.

The following table shows cost of sales by reportable segment for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Modules	$552,468	$694,060	$564,942	$(141,592)	(20)%	$129,118	23 %
Systems	1,299,399	1,698,317	1,701,203	(398,918)	(23)%	(2,886)	— %
Cost of sales	$1,851,867	$2,392,377	$2,266,145	$(540,510)	(23)%	$126,232	6 %
% of net sales	82.5 %	81.3 %	78.0 %				

Cost of sales decreased $540.5 million, or 23%, and increased 1.2 percentage points as a percent of net sales when comparing 2018 with 2017. The decrease in cost of sales was driven by a $398.9 million decrease in our systems segment cost of sales primarily due to the size of projects sold or under construction and the timing of when all revenue recognition criteria were met. The decrease in cost of sales was also driven by a $141.6 million decrease in our modules segment cost of sales primarily as a result of the following:

- lower costs of $241.4 million from a decrease in the volume of modules sold;
- a reduction in our module collection and recycling liability of $25.4 million in 2018 due to higher by-product credits for glass, lower capital costs, and adjustments to certain valuation assumptions; and
- continued cost reductions in the cost per watt of our solar modules, which decreased cost of sales by $22.6 million; partially offset by
- higher under-utilization and certain other charges associated with the initial ramp of certain Series 6 manufacturing lines, which increased cost of sales by $113.0 million;
- a reduction to our product warranty liability of $31.3 million in 2017 due to lower legacy module replacement costs; and
- a reduction in our module collection and recycling liability of $13.5 million in 2017 from updates to several valuation assumptions, including a decrease in certain inflation rates.

Cost of sales increased $126.2 million, or 6%, and increased 3.3 percentage points as a percentage of net sales when comparing 2017 with 2016. The increase in cost of sales was driven by a $129.1 million increase in our modules segment cost of sales primarily due to the following:

- higher costs of $366.2 million from the increased volume of modules sold directly to third parties; partially offset by
- continued cost reductions in the cost per watt of our solar modules, which decreased cost of sales by $182.4 million;
- the reduction in our product warranty liability of $31.3 million in 2017 described above;
- the reduction in our module collection and recycling liability of $13.5 million in 2017 described above; and
- lower inventory write-downs of $9.2 million.

Gross profit

Gross profit may be affected by numerous factors, including the selling prices of our modules and systems, our manufacturing costs, project development costs, BoS costs, the capacity utilization of our manufacturing facilities, and foreign exchange rates. Gross profit may also be affected by the mix of net sales from our modules and systems businesses.

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The following table shows gross profit for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Gross profit	$392,177	$548,947	$638,418	$(156,770)	(29)%	$(89,471)	(14)%
% of net sales	17.5 %	18.7 %	22.0 %				

Gross profit decreased 1.2 percentage points to 17.5% during 2018 from 18.7% during 2017 primarily as a result of higher under-utilization and certain other charges associated with the initial ramp of Series 6 manufacturing lines and the reduction to our product warranty liability in 2017 described above, partially offset by the mix of higher gross profit projects sold during the period and the settlement of a tax examination with the state of California, which affected our estimates of sales and use taxes due for certain projects.

Gross profit decreased 3.3 percentage points to 18.7% during 2017 from 22.0% during 2016 primarily due to a mix of lower gross profit projects sold and under construction during the period and reductions in the average selling price per watt of our modules sold directly to third parties, partially offset by the reductions in our product warranty liability and our module collection and recycling liability described above.

Selling, general and administrative

Selling, general and administrative expense consists primarily of salaries and other personnel-related costs, professional fees, insurance costs, and other business development and selling expenses.

The following table shows selling, general and administrative expense for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Selling, general and administrative	$176,857	$202,699	$261,994	$(25,842)	(13)%	$(59,295)	(23)%
% of net sales	7.9 %	6.9 %	9.0 %				

Selling, general and administrative expense in 2018 decreased compared to 2017 primarily from lower employee compensation expense, lower accretion expense associated with the reduction in our module collection and recycling liability described above, lower expenses related to project sales, and lower business development expense. This decrease was partially offset by higher charges for impairments of certain project assets in 2018. Selling, general and administrative expense in 2017 decreased compared to 2016 primarily due to higher impairments of certain project assets in 2016, lower employee compensation expense due to various restructuring activities, lower professional fees, lower infrastructure related expenses, and lower business development expenses.

Research and development

Research and development expense consists primarily of salaries and other personnel-related costs; the cost of products, materials, and outside services used in our R&D activities; and depreciation and amortization expense associated with R&D specific facilities and equipment. We maintain a number of programs and activities to improve our technology and processes in order to enhance the performance and reduce the costs of our solar modules and systems.

The following table shows research and development expense for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change	
(Dollars in thousands)	2018	2017	2016		2017 over 2016

				2018 over 2017			
Research and development	$84,472	$88,573	$124,762	$(4,101)	(5)%	$(36,189)	(29)%
% of net sales	3.8 %	3.0 %	4.3 %				

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Research and development expense in 2018 decreased compared to 2017 primarily due to lower employee compensation expense, lower facilities expense, and reduced material and module testing costs, partially offset by higher impairment charges for certain equipment. Research and development expense in 2017 decreased compared to 2016 primarily due to lower costs for third-party contracted services, reduced material and module testing costs, the termination of certain R&D programs for legacy module technologies, and lower employee compensation expense resulting from reductions to our headcount as part of various restructuring activities.

Production start-up

Production start-up expense consists primarily of employee compensation and other costs associated with operating a production line before it has been qualified for full production, including the cost of raw materials for solar modules run through the production line during the qualification phase and applicable facility related costs. Costs related to equipment upgrades and implementation of manufacturing process improvements are also included in production start-up expense as well as costs related to the selection of a new site, related legal and regulatory costs, and costs to maintain our plant replication program to the extent we cannot capitalize these expenditures. In general, we expect production start-up expense per production line to be higher when we build an entirely new manufacturing facility compared with the addition or replacement of production lines at an existing manufacturing facility, primarily due to the additional infrastructure investment required when building an entirely new facility.

The following table shows production start-up expense for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Production start-up	$90,735	$42,643	$1,021	$48,092	113%	$41,622	4,077%
% of net sales	4.0 %	1.4 %	— %				

During 2018, we incurred production start-up expense for the commencement of Series 6 module manufacturing at our facility in Ho Chi Minh City, Vietnam. We also incurred production start-up expense for the transition to Series 6 module manufacturing at our facilities in Kulim, Malaysia and Perrysburg, Ohio in 2017 and early 2018.

Restructuring and asset impairments

Restructuring and asset impairments consists of expenses incurred related to material restructuring initiatives and includes any associated asset impairments, costs for employee termination benefits, costs for contract terminations and penalties, and other restructuring related costs. Such restructuring initiatives are intended to align the organization with then current business conditions and to reduce costs.

The following table shows restructuring and asset impairments for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Restructuring and asset impairments	$—	$37,181	$743,862	$(37,181)	(100)%	$(706,681)	(95)%
% of net sales	—%	1.3 %	25.6 %				

In November 2016, our board of directors approved a set of initiatives to accelerate our transition to Series 6 module manufacturing and restructure our operations. In June 2016, we ended production of our crystalline silicon modules to focus on our core CdTe module and utility-scale systems. As a result of these decisions, we recorded restructuring and asset impairment charges of $41.8 million and $743.9 million during 2017 and 2016, respectively. In 2017, we also reversed a customs tax liability associated with a prior restructuring activity, which reduced our restructuring charges by $4.7 million during the period. See Note 4. “Restructuring and Asset Impairments” to our consolidated financial statements for additional information on these matters.

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Goodwill impairment

The following table shows goodwill impairments for the years ended December 31, 2018, 2017, and 2016:

(Dollars in thousands)	Years Ended 2018	2017	2016	Change 2018 over 2017		2017 over 2016	
Goodwill impairment	$—	$—	$74,930	$—	—%	$(74,930)	(100)%
% of net sales	—%	—%	2.6%				

As a result of our annual impairment analysis in the fourth quarter of 2016, we impaired the remaining $68.8 million of goodwill associated with our systems reporting unit primarily due to a strategic shift in the mix of our module and system net sales, which was approved by our board of directors in November 2016 as part of the restructuring activities described above. This shift involved an expected reduction in the annual megawatts sold through systems business projects. Other factors that contributed to the impairment included our reduced market capitalization and the challenging conditions within the solar industry as of the date of our testing. In June 2016, we also impaired the remaining $6.1 million of goodwill associated with our crystalline silicon modules reporting unit due to the decision to end the related manufacturing operations as further described above. See Note 6. “Goodwill and Intangible Assets” to our consolidated financial statements for additional information.

Foreign currency loss, net

Foreign currency loss, net consists of the net effect of gains and losses resulting from holding assets and liabilities and conducting transactions denominated in currencies other than our subsidiaries’ functional currencies.

The following table shows foreign currency loss, net for the years ended December 31, 2018, 2017, and 2016:

(Dollars in thousands)	Years Ended 2018	2017	2016	Change 2018 over 2017		2017 over 2016	
Foreign currency loss, net	$(570)	$(9,640)	$(14,007)	$9,070	(94)%	$4,367	(31)%

Foreign currency loss, net decreased in 2018 compared to 2017 primarily due to lower costs associated with hedging activities related to our subsidiaries in Japan, India, and Europe. Foreign currency loss, net decreased in 2017 compared to 2016 primarily as a result of lower costs associated with hedging activities related to our subsidiaries in India, the weakening of the U.S. dollar relative to certain foreign currencies, and differences between our economic hedge positions and the underlying exposures.

Interest income

Interest income is earned on our cash, cash equivalents, marketable securities, and restricted cash and investments. Interest income also includes interest earned from notes receivable and late customer payments.

The following table shows interest income for the years ended December 31, 2018, 2017, and 2016:

(Dollars in thousands)	Years Ended 2018	2017	2016	Change 2018 over 2017		2017 over 2016	
Interest income	$59,788	$35,704	$25,193	$24,084	67%	$10,511	42%

Interest income during 2018 increased compared to 2017 primarily as a result of higher time deposit balances and increased interest rates associated with cash, cash equivalents, and marketable securities, partially offset by lower balances of cash and cash equivalents. Interest income during 2017 increased compared to 2016 primarily due to higher cash balances during the period, higher interest rates associated with such cash balances, and a promissory note with an affiliate issued in late 2016.

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Interest expense, net

Interest expense is primarily comprised of interest incurred on long-term debt, settlements of interest rate swap contracts, and changes in the fair value of interest rate swap contracts that do not qualify for hedge accounting in accordance with Accounting Standards Codification (“ASC”) 815. We may capitalize interest expense into our project assets or property, plant and equipment when such costs qualify for interest capitalization, which reduces the amount of net interest expense reported in any given period.

The following table shows interest expense, net for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Interest expense, net	$(25,921)	$(25,765)	$(20,538)	$(156)	1%	$(5,227)	25%

Interest expense, net increased in 2018 compared to 2017 primarily due to changes in the fair value of interest rate swap contracts that do not qualify for hedge accounting and higher levels of project specific debt financings, partially offset by higher interest costs capitalized to certain projects under construction. Interest expense, net increased in 2017 compared to 2016 primarily due to changes in the fair value of interest rate swap contracts that do not qualify for hedge accounting and higher levels of project specific debt financings, partially offset by lower interest expense associated with certain Malaysian credit facilities that were fully repaid in 2016.

Other income, net

Other income, net is primarily comprised of miscellaneous items and realized gains and losses on the sale of marketable securities and restricted investments.

The following table shows other income, net for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Other income, net	$39,737	$23,965	$40,252	$15,772	66%	$(16,287)	(40)%

Other income, net increased in 2018 compared to 2017 primarily due to realized gains of $55.4 million in 2018 from the sale of certain restricted investments, partially offset by a $26.8 million settlement from the resolution of an outstanding matter with a former customer in 2017 and higher withholding taxes on certain payments by our foreign subsidiaries.

Other income, net decreased in 2017 compared to 2016 primarily due to realized gains of $41.3 million in 2016 from the sale of certain restricted investments and a $7.4 million reversal of the outstanding contingent consideration associated with our TetraSun acquisition as a result of our crystalline silicon module manufacturing restructuring in 2016, partially offset by the customer settlement in 2017 described above.

Income tax expense

In December 2017, the U.S. President signed into law the Tax Act, which significantly revised U.S. tax law by, among other things, lowering the statutory federal corporate income tax rate from 35% to 21% effective January 1, 2018, eliminating certain deductions, imposing a transition tax on certain accumulated earnings and profits of foreign corporate subsidiaries (the “transition tax”), introducing new tax regimes, and changing how foreign earnings are subject to U.S. tax. During 2017, we recognized certain provisional tax expenses associated with the Tax Act. We completed our accounting for the Tax Act in the fourth quarter of 2018 and recorded certain adjustments to our provisional tax expenses.

Income tax expense or benefit, deferred tax assets and liabilities, and liabilities for unrecognized tax benefits reflect our best estimate of current and future taxes to be paid. We are subject to income taxes in both the United States and

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numerous foreign jurisdictions in which we operate, principally Australia, India, and Malaysia. Significant judgments and estimates are required to determine our consolidated income tax expense. The statutory federal corporate income tax rate in the United States decreased from 35% to 21% beginning in January 2018. The tax rates in Australia, India, and Malaysia are 30%, 34.9%, and 24%, respectively. In Malaysia, we have been granted a long-term tax holiday, scheduled to expire in 2027, pursuant to which substantially all of our income earned in Malaysia is exempt from income tax, conditional upon our continued compliance with certain employment and investment thresholds.

The following table shows income tax expense for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Income tax expense	$(3,441)	$(371,996)	$(23,167)	$368,555	(99)%	$(348,829)	1,506%
Effective tax rate	3.0 %	184.1 %	(4.3)%				

Our tax rate is affected by recurring items, such as tax rates in foreign jurisdictions and the relative amounts of income we earn in those jurisdictions. The rate is also affected by discrete items that may occur in any given period, but are not consistent from period to period. Income tax expense decreased by $368.6 million during 2018 compared to 2017 primarily due to provisional tax expense of $408.1 million in 2017 related to the Tax Act and lower pretax income, partially offset by income earned in certain higher tax jurisdictions and a $42.1 million discrete tax benefit in 2017 associated with the acceptance of our election to classify certain of our German subsidiaries as disregarded entities of First Solar, Inc.

Income tax expense increased by $348.8 million during 2017 compared to 2016 primarily due to provisional tax expense related to the Tax Act as described above, higher pretax income, a $35.4 million reversal of an uncertain tax position in 2016 related to the income of a foreign subsidiary, and lower excess tax benefits associated with share-based compensation, partially offset by certain U.S. taxes in 2016 on a cash distribution received from a foreign subsidiary and a $42.1 million discrete tax benefit as described above. See Note 19. “Income Taxes” to our consolidated financial statements for additional information.

Equity in earnings, net of tax

Equity in earnings, net of tax represents our proportionate share of the earnings or losses from equity method investments as well as any gains or losses on the sale or disposal of such investments.

The following table shows equity in earnings, net of tax for the years ended December 31, 2018, 2017, and 2016:

	Years Ended			Change			
(Dollars in thousands)	2018	2017	2016	2018 over 2017		2017 over 2016	
Equity in earnings, net of tax	$34,620	$4,266	$144,306	$30,354	712%	$(140,040)	(97)%

Equity in earnings, net of tax increased in 2018 compared to 2017 primarily due to the sale of our ownership interests in 8point3 Operating Company, LLC (“OpCo”) in June 2018, which resulted in a gain of $40.3 million, net of tax. See Note 12. “Equity Method Investments” to our consolidated financial statements for additional information. Equity in earnings, net of tax decreased in 2017 compared to 2016 primarily due to the recognition of a gain of $125.1 million, net of tax, in December 2016 from the sale of our residual interest in the Desert Stateline project to OpCo and lower equity in earnings from our investment in OpCo.

Liquidity and Capital Resources

As of December 31, 2018, we believe that our cash, cash equivalents, marketable securities, cash flows from operating activities, advanced-stage project pipeline, availability under our Revolving Credit Facility (considering the minimum liquidity covenant requirements therein), and access to the capital markets will be sufficient to meet our working capital, systems project investment, and capital expenditure needs for at least the next 12 months. We monitor our working capital to ensure we have adequate liquidity, both domestically and internationally.

We intend to maintain appropriate debt levels based upon cash flow expectations, our overall cost of capital, and expected cash requirements for operations, capital expenditures, and strategic discretionary spending. In the future, we may also engage in additional debt or equity financings, including project specific debt financings. We believe that when necessary, we will have adequate access to the capital markets, although our ability to raise capital on terms commercially acceptable to us could be constrained if there is insufficient lender or investor interest due to industry-wide or company-specific concerns. Such financings could result in increased debt service expenses, dilution to our existing stockholders, or restrictive covenants, which could restrain our ability to pursue our strategic plans.

As of December 31, 2018, we had $2.5 billion in cash, cash equivalents, and marketable securities compared to $3.0 billion as of December 31, 2017. Cash, cash equivalents, and marketable securities as of December 31, 2018 decreased primarily as a result of purchases of property, plant and equipment and operating expenditures associated with the initial ramp of certain Series 6 manufacturing lines, partially offset by proceeds associated with the sale of our interests in 8point3 and its subsidiaries and net proceeds from borrowings under project specific debt financings. As of December 31, 2018 and 2017, $1.2 billion and $1.6 billion, respectively, of our cash, cash equivalents, and marketable securities was held by our foreign subsidiaries and was primarily based in U.S. dollar, Euro, and Japanese yen denominated holdings.

We utilize a variety of tax planning and financing strategies in an effort to ensure that our worldwide cash is available in the locations in which it is needed. If certain international funds were needed for our operations in the United States, we may be required to accrue and pay certain U.S. and foreign taxes to repatriate such funds. We maintain the intent and ability to permanently reinvest our accumulated earnings outside of the United States, with the exception of our subsidiaries in Canada and Germany. In addition, changes to foreign government banking regulations may restrict our ability to move funds among various jurisdictions under certain circumstances, which could negatively impact our access to capital, resulting in an adverse effect on our liquidity and capital resources.

Our systems business requires significant liquidity and is expected to continue to have significant liquidity requirements in the future. The net amount of our project assets and related portion of deferred revenue, which approximates our net capital investment in the development and construction of systems projects, was $467.3 million as of December 31, 2018. Solar power project development and construction cycles, which span the time between the identification of a site location and the commercial operation of a system, vary substantially and can take many years to mature. As a result of these long project cycles and strategic decisions to finance the construction of certain projects using our working capital, we may need to make significant up-front investments of resources in advance of the receipt of any cash from the sale of such projects. Delays in construction or in completing the sale of our systems projects that we are self-financing may also impact our liquidity. In certain circumstances, we may need to finance construction costs exclusively using working capital, if project financing becomes unavailable due to market-wide, regional, or other concerns.

From time to time, we may develop projects in certain markets around the world where we may hold all or a significant portion of the equity in a project for several years. Given the duration of these investments and the currency risk relative to the U.S. dollar in some of these markets, we continue to explore local financing alternatives. Should these financing alternatives be unavailable or too cost prohibitive, we could be exposed to significant currency risk and our liquidity could be adversely impacted.

Additionally, we may elect to retain an ownership interest in certain systems projects after they become operational if we determine it would be of economic and strategic benefit to do so. If, for example, we cannot sell a systems project

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at economics that are attractive to us or potential customers are unwilling to assume the risks and rewards typical of PV solar power system ownership, we may instead elect to temporarily own and operate such systems until we can sell the systems on economically attractive terms. The decision to retain ownership of a system impacts liquidity depending upon the size and cost of the project. As of December 31, 2018, we had $308.6 million of net PV solar power systems that had been placed in service, primarily in international markets. We have elected, and may in the future elect, to enter into temporary or long-term project financing to reduce the impact on our liquidity and working capital with regards to such projects and systems. We may also consider entering into tax equity or other arrangements with respect to ownership interests in certain of our projects, which could cause a portion of the economics of such projects to be realized over time.

The following additional considerations have impacted or may impact our liquidity in 2019 and beyond:

- We expect to make significant capital investments over the next several years as we transition our production to Series 6 module technology and purchase the related manufacturing equipment and infrastructure. These investments also include the commencement and expansion of operations at our existing manufacturing plant in Vietnam and the construction of an additional U.S. manufacturing plant in Lake Township, Ohio. We expect the aggregate capital investment for currently planned Series 6 related programs to be approximately $2.0 billion, including $1.1 billion of capital expenditures already made as of December 31, 2018. These capital investments are expected to provide an annual Series 6 manufacturing capacity of approximately 6.6 GW_{DC} once completed. During 2019, we expect to spend $650 million to $750 million for capital expenditures, the majority of which is associated with the Series 6 transition. We believe these capital expenditures will, over time, increase our aggregate manufacturing capacity, reduce our manufacturing costs, and increase our solar module wattage.

- 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 solar modules or increase our manufacturing costs. Accordingly, we may enter into long-term supply agreements to mitigate potential risks related to the procurement of key raw materials and components, and such agreements may be noncancelable or cancelable with a significant penalty. For example, we have entered into long-term supply agreements for the purchase of certain specified minimum volumes of substrate glass and cover glass for our PV solar modules. Our actual purchases under these supply agreements are expected to be approximately $2.4 billion of substrate glass and $500 million of cover glass. We have the right to terminate these agreements upon payment of specified termination penalties (which are up to $430 million in the aggregate and decline over time during the respective supply periods).

- The balance of our solar module inventories and BoS parts was $309.3 million as of December 31, 2018. As we continue to develop and construct our advanced-stage project pipeline, we must produce solar modules and procure BoS parts in volumes sufficient to support our planned construction schedules. As part of this construction cycle, we typically produce or procure these inventories in advance of receiving payment for such materials, which may temporarily reduce our liquidity. Once solar modules and BoS parts are installed in a project, they are classified as either project assets, PV solar power systems, or cost of sales depending on whether the project is subject to a definitive sales contract and whether other revenue recognition criteria have been met. We also produce significant volumes of modules for sale directly to third-parties, which requires us to carry inventories at levels sufficient to satisfy the demand of our customers and the needs of their utility-scale projects, which may also temporarily reduce our liquidity.

- We may commit significant working capital over the next several years to advance the construction of various U.S. systems projects or procure the associated BoS parts by specified dates for such projects to qualify for certain federal investment tax credits. Among other requirements, such credits require projects to commence construction in 2019, which may be achieved by certain qualifying procurement activities, to receive a 30% investment tax credit. The credit will step down to 26% for projects that commence construction in 2020, 22% for projects that commence construction in 2021, and 10% for projects that commence construction thereafter.

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- We may also commit working capital to acquire solar power projects in various stages of development, including advanced-stage projects with PPAs, and to continue developing those projects as necessary. Depending upon the size and stage of development, the costs to acquire such solar power projects could be significant. When evaluating project acquisition opportunities, we consider both the strategic and financial benefits of any such acquisitions.

Cash Flows

The following table summarizes key cash flow activity for the years ended December 31, 2018, 2017, and 2016 (in thousands):

	2018	2017	2016
Net cash (used in) provided by operating activities	$(326,809)	$1,340,677	$206,753
Net cash (used in) provided by investing activities	(682,714)	(626,802)	144,520
Net cash provided by (used in) financing activities	255,228	192,045	(136,393)
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(13,558)	8,866	(6,306)
Net (decrease) increase in cash, cash equivalents and restricted cash	$(767,853)	$914,786	$208,574

Operating Activities

The decrease in net cash provided by operating activities during 2018 was primarily driven by lower cash proceeds from sales of systems projects, including the sales of the Moapa, California Flats, Switch Station, and Cuyama projects in 2017, higher liabilities assumed by customers as part of the consideration for certain projects sold, and operating expenditures associated with our ongoing transition to Series 6 module manufacturing. The increase in net cash provided by operating activities during 2017 was primarily driven by the sale of the projects described above, partially offset by expenditures for the construction of certain projects.

Investing Activities

The increase in net cash used in investing activities during 2018 was primarily due to higher purchases of property, plant and equipment driven by our transition to Series 6 module manufacturing and an increase in net purchases of marketable securities and restricted investments, partially offset by proceeds associated with the sale of our interests in 8point3 and its subsidiaries. The increase in net cash used in investing activities during 2017 was primarily due to (i) proceeds from sales of equity method investments in 2016, including the sale of our remaining interest in the Desert Stateline project, (ii) an increase in purchases of property, plant and equipment driven by our transition to Series 6 module manufacturing, and (iii) net higher net purchases of marketable securities and restricted investments.

Financing Activities

The increase in net cash provided by financing activities during 2018 was primarily the result of higher net proceeds from borrowings under long-term debt arrangements associated with the construction of certain projects in Australia, Japan, and India and lower payments for contingent obligations associated with the acquisition of certain projects in Japan, partially offset by lower proceeds from commercial letters of credit for the construction of certain projects in India. The increase in net cash provided by financing activities during 2017 was primarily the result of net proceeds from borrowings under long-term debt arrangements associated with the construction of certain projects in Japan, India, and Australia and proceeds from commercial letters of credit for the construction of certain projects in India.

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Contractual Obligations

The following table presents the payments due by fiscal year for our outstanding contractual obligations as of December 31, 2018 (in thousands):

		Payments Due by Year			
	Total	Less Than 1 Year	1 - 3 Years	3 - 5 Years	More Than 5 Years
Long-term debt obligations	$479,157	$5,673	$92,949	$83,841	$296,694
Interest payments (1)	190,760	20,091	36,678	30,403	103,588
Operating lease obligations	146,814	13,839	17,340	15,573	100,062
Purchase obligations (2)	1,388,726	875,653	186,218	164,807	162,048
Recycling obligations	134,442	—	—	—	134,442
Contingent consideration (3)	2,915	665	2,250	—	—
Transition tax obligations (4)	81,186	4,170	14,670	21,088	41,258
Other obligations (5)	20,699	4,565	9,138	6,996	—
Total	$2,444,699	$924,656	$359,243	$322,708	$838,092

(1) Includes estimated cash interest to be paid over the remaining terms of the underlying debt. Interest payments are based on fixed and floating rates as of December 31, 2018.

(2) Purchase obligations represent agreements to purchase goods or services, including open purchase orders and contracts with fixed volume commitments, that are noncancelable or cancelable with a significant penalty. Purchase obligations for our long-term supply agreements for the purchase of substrate glass and cover glass represent specified termination penalties, which are up to $430 million in the aggregate under the agreements. Our actual purchases under these supply agreements are expected to be approximately $2.4 billion of substrate glass and $500 million of cover glass.

(3) In connection with business or project acquisitions, we may agree to pay additional amounts to the selling parties upon achievement of certain milestones. See Note 15. “Commitments and Contingencies” to our consolidated financial statements for further information.

(4) Transition tax obligations represent estimated payments for U.S. federal taxes associated with accumulated earnings and profits of our foreign corporate subsidiaries. See Note 19. “Income Taxes” to our consolidated financial statements for further information.

(5) Includes expected letter of credit fees and unused revolver fees.

We have excluded $72.2 million of unrecognized tax benefits from the amounts presented above as the timing of such obligations is uncertain.

Off-Balance Sheet Arrangements

As of December 31, 2018, we had no off-balance sheet debt or similar obligations, other than financial assurance related instruments and operating leases, which are not classified as debt. We do not guarantee any third-party debt. See Note 15. “Commitments and Contingencies” to our consolidated financial statements for further information about our financial assurance related instruments.

Recent Accounting Pronouncements

See Note 3. “Recent Accounting Pronouncements” to our consolidated financial statements for a summary of recent accounting pronouncements.

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Critical Accounting Estimates

In preparing our consolidated financial statements in conformity with generally accepted accounting principles in the United States ("U.S. GAAP"), we make estimates and assumptions that affect the amounts of reported assets, liabilities, revenues, and expenses, as well as the disclosure of contingent liabilities. Some of our accounting policies require the application of significant judgment in the selection of the appropriate assumptions for making these estimates. By their nature, these judgments are subject to an inherent degree of uncertainty. We base our judgments and estimates on our historical experience, our forecasts, and other available information as appropriate. The actual results experienced by us may differ materially and adversely from our estimates. To the extent there are material differences between our estimates and the actual results, our future results of operations will be affected. Our significant accounting policies are described in Note 2. "Summary of Significant Accounting Policies" to our consolidated financial statements. The accounting policies that require the most significant judgment and estimates include the following:

Revenue Recognition – Solar Power System Sales and/or EPC Services. We generally recognize revenue for sales of solar power systems and/or EPC services over time as our performance creates or enhances an energy generation asset controlled by the customer. Furthermore, the sale of a solar power system when combined with EPC services represents a single performance obligation for the development and construction of a single generation asset. For such sale arrangements, we recognize revenue using cost based input methods, which recognize revenue and gross profit as work is performed based on the relationship between actual costs incurred compared to the total estimated costs of the contract. For sales of solar power systems in which we obtain an interest in the project sold to the customer, we recognize all of the revenue for the consideration received, including the fair value of the noncontrolling interest we obtained, and defer any profit associated with the interest obtained through "Equity in earnings, net of tax." We may also recognize revenue for the sale of a solar power system after it has been completed due to the timing of when we enter into the associated sales contract with the customer.

Estimating the fair value of a noncontrolling interest we obtain begins with the valuation of the entire solar project (i.e., solar power system) being sold to the customer. Such valuation generally uses an income based valuation technique in which relevant cash flows are discounted to estimate the expected economic earnings capacity of the project. Typical factors considered in a project's valuation include expected energy generation, the duration and pricing of the PPA, the pricing of energy to be sold on an open contract basis following the termination of the PPA (i.e., merchant pricing curves), other offtake agreements, the useful life of the system, tax attributes such as accelerated depreciation and tax credits, sales of renewable energy certificates, interconnection rights, operating agreements, and the cost of capital. Once the overall project valuation is agreed upon with the customer, we determine the relative value related to our specific ownership interests conveyed through the transaction agreements, including the membership interest purchase and sale agreement and the limited liability company agreement (or equivalent) of the project or its holding company.

In applying cost based input methods of revenue recognition, we use the actual costs incurred relative to the total estimated costs (including solar module costs) to determine our progress towards contract completion and to calculate the corresponding amount of revenue and gross profit to recognize. Cost based input methods of revenue recognition are considered a faithful depiction of our efforts to satisfy long-term construction contracts and therefore reflect the transfer of goods to a customer under such contracts. Costs incurred that do not contribute to satisfying our performance obligations ("inefficient costs") are excluded from our input methods of revenue recognition as the amounts are not reflective of our transferring control of the system to the customer. Costs incurred towards contract completion may include costs associated with solar modules, direct materials, labor, subcontractors, and other indirect costs related to contract performance. We recognize solar module and direct material costs as incurred when such items have been installed in a system. Cost based input methods of revenue recognition require us to make estimates of net contract revenues and costs to complete our projects. In making such estimates, significant judgment is required to evaluate assumptions related to the amount of net contract revenues, including the impact of any performance incentives, liquidated damages, and other payments to customers. Significant judgment is also required to evaluate assumptions related to the costs to complete our projects, including materials, labor, contingencies, and other system costs.

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If the estimated total costs on any contract, including any inefficient costs, are greater than the net contract revenues, we recognize the entire estimated loss in the period the loss becomes known. The cumulative effect of revisions to estimates related to net contract revenues or costs to complete contracts are recorded in the period in which the revisions to estimates are identified and the amounts can be reasonably estimated. The effect of the changes on future periods are recognized as if the revised estimates had been used since revenue was initially recognized under the contract. Such revisions could occur in any reporting period, and the effects may be material depending on the size of the contracts or the changes in estimates.

As part of our solar power system sales, we conduct performance testing of a system prior to substantial completion to confirm the system meets its operational and capacity expectations noted in the EPC agreement. In addition, we may provide an energy performance test during the first or second year of a system's operation to demonstrate that the actual energy generation for the applicable period meets or exceeds the modeled energy expectation, after certain adjustments. These tests are based on meteorological, energy, and equipment performance data measured at the system's location as well as certain projections of such data over the remaining measurement period. In certain instances, a bonus payment may be received at the end of the applicable test period if the system performs above a specified level. Conversely, if there is an underperformance event with regards to these tests, we may incur liquidated damages as a percentage of the EPC contract price. Such performance guarantees represent a form of variable consideration and are estimated at contract inception at their most likely amount and updated at the end of each reporting period as additional performance data becomes available and only to the extent that it is probable that a significant reversal of any incremental revenue will not occur.

Revenue Recognition – Operations and Maintenance. We recognize revenue for standard, recurring O&M services over time as customers receive and consume the benefits of such services. Costs of O&M services are expensed in the period in which they are incurred. As part of our O&M service offerings, we typically offer an effective availability guarantee, which stipulates that a system will be available to generate a certain percentage of total possible energy during a specific period after adjusting for factors outside of our control as the service provider. These tests are based on meteorological, energy, and equipment performance data measured at the system's location as well as certain projections of such data over the remaining measurement period. If system availability exceeds a contractual threshold, we may receive a bonus payment, or if system availability falls below a separate threshold, we may incur liquidated damages for certain lost energy under the PPA. Such bonuses or liquidated damages represent a form of variable consideration and are estimated and recognized over time as customers receive and consume the benefits of the O&M services.

Accrued Solar Module Collection and Recycling Liability. When applicable, we recognize expense at the time of sale for the estimated cost of our obligations to collect and recycle solar modules covered by our solar module collection and recycling program. We estimate the cost of our collection and recycling obligations based on the present value of the expected probability-weighted future cost of collecting and recycling the solar modules, which includes estimates for the cost of packaging materials; the cost of freight from the solar module installation sites to a recycling center; material, labor, and capital costs; the scale of recycling centers; and an estimated third-party profit margin and return on risk for collection and recycling services. We base these estimates on (i) our experience collecting and recycling our solar modules, (ii) the expected timing of when our solar modules will be returned for recycling, and (iii) the expected economic factors at the time the solar modules will be collected and recycled. In the periods between the time of sale and the related settlement of the collection and recycling obligation, we accrete the carrying amount of the associated liability by applying the discount rate used for its initial measurement. We periodically review our estimates of expected future recycling costs and may adjust our liability accordingly.

Product Warranties. We provide a limited PV solar module warranty covering defects in materials and workmanship under normal use and service conditions for approximately 10 years. We also typically warrant that modules installed in accordance with agreed-upon specifications will produce at least 98% of their labeled power output rating during the first year, with the warranty coverage reducing by 0.5% every year thereafter throughout the approximate 25-year limited power output warranty period.

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As an alternative form of our standard limited module power output warranty, we also offer an aggregated or system-level limited module performance warranty. This system-level limited module performance warranty is designed for utility-scale systems and provides 25-year system-level energy degradation protection. This warranty represents a practical expedient to address the challenge of identifying, from the potential millions of modules installed in a utility-scale system, individual modules that may be performing below warranty thresholds by focusing on the aggregate energy generated by the system rather than the power output of individual modules. The system-level limited module performance warranty is typically calculated as a percentage of a system's expected energy production, adjusted for certain actual site conditions, with the warranted level of performance declining each year in a linear fashion, but never falling below 80% during the term of the warranty.

In addition to our limited solar module warranties described above, for PV solar power systems we construct, we typically provide limited warranties for defects in engineering design, installation, and BoS part workmanship for a period of one to two years following the substantial completion of a system or a block within the system.

When we recognize revenue for module or system sales, we accrue liabilities for the estimated future costs of meeting our limited warranty obligations. We make and revise these estimates based primarily on the number of our solar modules under warranty installed at customer locations, our historical experience with warranty claims, our monitoring of field installation sites, our internal testing of and the expected future performance of our solar modules and BoS parts, and our estimated per-module replacement costs. As a result of such factors, we estimate our limited product warranties based on warranty return rates of approximately 1% to 3% for modules covered under warranty, depending on the series of module technology.

Income Taxes. We are subject to the income tax laws of the United States, its states and municipalities, and those of the foreign jurisdictions in which we have significant business operations. Such tax laws are complex and subject to different interpretations by the taxpayer and the relevant taxing authorities. We make judgments and interpretations regarding the application of these inherently complex tax laws when determining our provision for income taxes and also make estimates about when in the future certain items are expected to affect taxable income in the various tax jurisdictions. Disputes over interpretations of tax laws may be settled with the relevant taxing authority upon examination or audit. We regularly evaluate the likelihood of assessments in each of our taxing jurisdictions resulting from current and future examinations, and we record tax liabilities as appropriate.

In preparing our consolidated financial statements, we calculate our income tax provision based on our interpretation of the tax laws and regulations in the various jurisdictions where we conduct business. This requires us to estimate our current tax obligations, assess uncertain tax positions, and assess temporary differences between the financial statement carrying amounts and the tax basis of assets and liabilities. These temporary differences result in deferred tax assets and liabilities. We must also assess the likelihood that each of our deferred tax assets will be realized. To the extent we believe that realization of any of our deferred tax assets is not more likely than not, we establish a valuation allowance. When we establish a valuation allowance or increase this allowance in a reporting period, we generally record a corresponding tax expense. Conversely, to the extent circumstances indicate that a valuation allowance is no longer necessary, that portion of the valuation allowance is reversed, which generally reduces our overall income tax expense.

We establish liabilities for potential additional taxes based on our assessment of the outcome of our tax positions. Once established, we adjust these liabilities when additional information becomes available or when an event occurs requiring an adjustment. Significant judgment is required in making these estimates and the actual cost of a tax assessment, fine, or penalty may ultimately be materially different from our recorded liabilities, if any.

We continually explore initiatives to better align our tax and legal entity structure with the footprint of our global operations and recognize the tax impact of these initiatives, including changes in the assessment of uncertain tax positions, indefinite reinvestment exception assertions, and the realizability of deferred tax assets, in the period when we believe all necessary internal and external approvals associated with such initiatives have been obtained, or when the initiatives are materially complete.

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Asset Impairments. We assess long-lived assets classified as “held and used,” including our property, plant and equipment; project assets; PV solar power systems; and intangible assets for impairment whenever events or changes in circumstances arise, including consideration of technological obsolescence, that may indicate that the carrying amount of such assets may not be recoverable, and these assessments require significant judgment in determining whether such events or changes have occurred. Relevant considerations may include a significant decrease in the market price of a long-lived asset; a significant adverse change in the extent or manner in which a long-lived asset is being used or in its physical condition; a significant adverse change in the business climate that could affect the value of a long-lived asset; an accumulation of costs significantly in excess of the amount originally expected for the acquisition or construction of a long-lived asset; a current-period operating or cash flow loss combined with a history of such losses or a projection of future losses associated with the use of a long-lived asset; or a current expectation that, more likely than not, a long-lived asset will be sold or otherwise disposed of significantly before the end of its previously estimated useful life. For purposes of recognition and measurement of an impairment loss, long-lived assets are grouped with other assets and liabilities at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities, and we must also exercise judgment in assessing such groupings and levels.

When impairment indicators are present, we compare undiscounted future cash flows, including the eventual disposition of the asset group at market value, to the asset group’s carrying value to determine if the asset group is recoverable. If the carrying value of the asset group exceeds the undiscounted future cash flows, we measure any impairment by comparing the fair value of the asset group to its carrying value. Fair value is generally determined by considering (i) internally developed discounted cash flows for the asset group, (ii) third-party valuations, and/or (iii) information available regarding the current market value for such assets. If the fair value of an asset group is determined to be less than its carrying value, an impairment in the amount of the difference is recorded in the period that the impairment indicator occurs. Estimating future cash flows requires significant judgment, and such projections may vary from the cash flows eventually realized.

Goodwill. Goodwill represents the excess of the purchase price of acquired businesses over the estimated fair value assigned to the individual assets acquired and liabilities assumed. We do not amortize goodwill, but instead are required to test goodwill for impairment at least annually. We perform impairment tests between the scheduled annual test in the fourth quarter if facts and circumstances indicate that it is more likely than not that the fair value of a reporting unit that has goodwill is less than its carrying value.

We may first make a qualitative assessment of whether it is more likely than not that a reporting unit’s fair value is less than its carrying value to determine whether it is necessary to perform a quantitative goodwill impairment test. Such qualitative impairment test considers various factors, including macroeconomic conditions, industry and market considerations, cost factors, the overall financial performance of a reporting unit, and any other relevant events affecting our company or a reporting unit. If we determine through the qualitative assessment that a reporting unit’s fair value is more likely than not greater than its carrying value, the quantitative impairment test is not required. If the qualitative assessment indicates it is more likely than not that a reporting unit’s fair value is less than its carrying value, we perform a quantitative impairment test. We may also elect to proceed directly to the quantitative impairment test without considering qualitative factors.

The quantitative impairment test is the comparison of the fair value of a reporting unit with its carrying amount, including goodwill. Our reporting units consist of our modules business and our fully integrated systems business. We define the fair value of a reporting unit as the price that would be received to sell the unit as a whole in an orderly transaction between market participants at the measurement date. We primarily use an income approach to estimate the fair value of our reporting units. Significant judgment is required when estimating the fair value of a reporting unit, including the forecasting of future operating results and the selection of discount and expected future growth rates used to determine projected cash flows. If the estimated fair value of a reporting unit exceeds its carrying value, goodwill is not impaired, and no further analysis is required. Conversely, if the carrying value of a reporting unit exceeds its estimated fair value, we record an impairment loss equal to the excess, not to exceed the total amount of goodwill allocated to the reporting unit.

Item 7A. Quantitative and Qualitative Disclosures about Market Risk

Foreign Currency Exchange Risk

Cash Flow Exposure. We expect certain of our subsidiaries to have future cash flows that will be denominated in currencies other than the subsidiaries' functional currencies. Changes in the exchange rates between the functional currencies of our subsidiaries and the other currencies in which they transact will cause fluctuations in the cash flows we expect to receive or pay when these cash flows are realized or settled. Accordingly, we enter into foreign exchange forward contracts to hedge a portion of these forecasted cash flows. These foreign exchange forward contracts qualify for accounting as cash flow hedges in accordance with ASC 815 and we designated them as such. We initially report the effective portion of a derivative's unrealized gain or loss in "Accumulated other comprehensive (loss) income" and subsequently reclassify amounts into earnings when the hedged transaction occurs and impacts earnings. For additional details on our derivative hedging instruments and activities, see Note 10. "Derivative Financial Instruments" to our consolidated financial statements.

Certain of our international operations, such as our manufacturing facilities in Malaysia and Vietnam, pay a portion of their operating expenses, including associate wages and utilities, in local currencies, which exposes us to foreign currency exchange risk for such expenses. Our manufacturing facilities are also exposed to foreign currency exchange risk for purchases of certain equipment from international vendors. As we expand into new markets worldwide, particularly emerging markets, our total foreign currency exchange risk, in terms of both size and exchange rate volatility, and the number of foreign currencies we are exposed to could increase significantly.

For the year ended December 31, 2018, 23% of our net sales were denominated in foreign currencies, including Japanese yen and Indian rupees. As a result, we have exposure to foreign currencies with respect to our net sales, which has historically represented one of our primary foreign currency exchange risks. A 10% change in the U.S. dollar to Japanese yen and U.S dollar to Indian rupee exchange rates would have had an aggregate impact on our net sales of $38.4 million, excluding the effect of our hedging activities.

Transaction Exposure. Many of our subsidiaries have assets and liabilities (primarily cash, receivables, marketable securities, deferred taxes, payables, accrued expenses, and solar module collection and recycling liabilities) that are denominated in currencies other than the subsidiaries' functional currencies. Changes in the exchange rates between the functional currencies of our subsidiaries and the other currencies in which these assets and liabilities are denominated will create fluctuations in our reported consolidated statements of operations and cash flows. We may enter into foreign exchange forward contracts or other financial instruments to economically hedge assets and liabilities against the effects of currency exchange rate fluctuations. The gains and losses on such foreign exchange forward contracts will economically offset all or part of the transaction gains and losses that we recognize in earnings on the related foreign currency denominated assets and liabilities. For additional details on our economic hedging instruments and activities, see Note 10. "Derivative Financial Instruments" to our consolidated financial statements.

As of December 31, 2018, a 10% change in the U.S. dollar to Vietnamese dong exchange rate, which represented one of our primary foreign currency exposures, would impact our net foreign currency loss by $2.8 million, including the effect of our hedging activities.

Interest Rate Risk

Variable Rate Debt Exposure. We are exposed to interest rate risk as certain of our project specific debt financings have variable interest rates, exposing us to variability in interest expense and cash flows. See Note 14. "Debt" to our consolidated financial statements for additional information on our long-term debt borrowing rates. An increase in relevant interest rates would increase the cost of borrowing under certain of our project specific debt financings. If such variable interest rates changed by 100 basis points, our interest expense for the year ended December 31, 2018 would have changed by $1.0 million, including the effect of our hedging activities.

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Customer Financing Exposure. We are also indirectly exposed to interest rate risk because many of our customers depend on debt financings to purchase modules or systems. An increase in interest rates could make it challenging for our customers to obtain the capital necessary to make such purchases on favorable terms, or at all. Such factors could reduce demand or lower the price we can charge for our modules and systems, thereby reducing our net sales and gross profit. In addition, we believe that a significant percentage of our customers purchase systems as an investment, funding the initial capital expenditure through a combination of equity and debt. An increase in interest rates could lower an investor's return on investment in a system or make alternative investments more attractive relative to PV solar power systems, which, in either case, could cause these end-users to seek alternative investments with higher returns.

Marketable Securities and Restricted Investments Exposure. We invest in various debt securities, which exposes us to interest rate risk. The primary objectives of our investment activities are to preserve principal and provide liquidity, while at the same time maximizing the return on our investments. Many of the securities in which we invest may be subject to market risk. Accordingly, a change in prevailing interest rates may cause the market value of such investments to fluctuate. For example, if we hold a security that was issued with an interest rate fixed at the then-prevailing rate and the prevailing interest rate subsequently rises, the market value of our investment may decline.

For the year ended December 31, 2018, our marketable securities earned a return of 2%, including the impact of fluctuations in the price of the underlying securities, and had a weighted-average maturity of 5 months as of the end of the period. Based on our investment positions as of December 31, 2018, a hypothetical 100 basis point change in interest rates would have resulted in a $3.2 million change in the market value of our investment portfolio. For the year ended December 31, 2018, our restricted investments earned a return of 4%, including the impact of fluctuations in the price of the underlying securities, and had a weighted-average maturity of approximately 13 years as of the end of the period. Based on our restricted investment positions as of December 31, 2018, a hypothetical 100 basis point change in interest rates would have resulted in a $29.4 million change in the market value of our restricted investment portfolio.

Commodity and Component Risk

We are exposed to price risks for the raw materials, components, services, and energy costs used in the manufacturing and transportation of our solar modules and BoS parts used in our systems. Also, some of our raw materials and components are sourced from a limited number of suppliers or a single supplier. We endeavor to qualify multiple suppliers using a robust qualification process. In some cases, we also enter into long-term supply contracts for raw materials and components. Accordingly, we are exposed to price changes in the raw materials and components used in our solar modules and systems. In addition, the failure of a key supplier could disrupt our supply chain, which could result in higher prices and/or a disruption in our manufacturing or construction processes. We may be unable to pass along changes in the costs of the raw materials and components for our modules and systems to our customers and may be in default of our delivery obligations if we experience a manufacturing or construction disruption.

Credit Risk

We have certain financial and derivative instruments that subject us to credit risk. These consist primarily of cash, cash equivalents, marketable securities, accounts receivable, restricted cash and investments, notes receivable, and foreign exchange forward contracts. We are exposed to credit losses in the event of nonperformance by the counterparties to our financial and derivative instruments. We place cash, cash equivalents, marketable securities, restricted cash and investments, and foreign exchange forward contracts with various high-quality financial institutions and limit the amount of credit risk from any one counterparty. We continuously evaluate the credit standing of our counterparty financial institutions. Our net sales are primarily concentrated among a limited number of customers. We monitor the financial condition of our customers and perform credit evaluations whenever considered necessary. Depending upon the sales arrangement, we may require some form of payment security from our customers, including advance payments, parent guarantees, bank guarantees, surety bonds, or commercial letters of credit. We also have PPAs that subject us to credit risk in the event our offtake counterparties are unable to fulfill their contractual obligations, which may adversely affect our project assets and certain receivables. Accordingly, we closely monitor the credit standing of existing and potential offtake counterparties to limit such risks.

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Item 8. Financial Statements and Supplementary Data

Consolidated Financial Statements

Our consolidated financial statements as required by this item are included in Item 15. “Exhibits and Financial Statement Schedules.” See Item 15(a) for a list of our consolidated financial statements.

Selected Quarterly Financial Data (Unaudited)

The following selected quarterly financial data should be read in conjunction with our consolidated financial statements and the related notes thereto and Item 7. “Management’s Discussion and Analysis of Financial Condition and Results of Operations.” This information has been derived from our unaudited consolidated financial statements that, in our opinion, reflect all recurring adjustments necessary to fairly present this information when read in conjunction with our consolidated financial statements. The results of operations for any quarter are not necessarily indicative of the results to be expected for any future period.

	Quarters Ended							
	Dec 31, 2018	Sep 30, 2018	Jun 30, 2018	Mar 31, 2018	Dec 31, 2017	Sep 30, 2017	Jun 30, 2017	Mar 31, 2017
	(In thousands, except per share amounts)							
Net sales	$691,241	$676,220	$309,318	$567,265	$339,181	$1,087,026	$623,326	$891,791
Gross profit (loss)	98,310	129,127	(8,058)	172,798	62,070	291,800	110,893	84,184
Production start-up	14,576	14,723	24,352	37,084	20,488	12,624	8,381	1,150
Restructuring and asset impairments	—	—	—	—	(1,927)	791	18,286	20,031
Operating income (loss)	11,008	58,475	(103,634)	74,264	(35,071)	206,989	13,928	(7,995)
Net income (loss)	52,116	57,750	(48,491)	82,951	(432,454)	205,747	51,963	9,129
Net income (loss) per share:								
Basic	$0.50	$0.55	$(0.46)	$0.79	$(4.14)	$1.97	$0.50	$0.09
Diluted	$0.49	$0.54	$(0.46)	$0.78	$(4.14)	$1.95	$0.50	$0.09

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

We carried out an evaluation, under the supervision and with the participation of management, including our Chief Executive Officer and Chief Financial Officer, of the effectiveness of our “disclosure controls and procedures” as defined in Exchange Act Rule 13a-15(e) and 15d-15(e). Based on that evaluation, our Chief Executive Officer and Chief Financial Officer concluded that as of December 31, 2018 our disclosure controls and procedures were effective to ensure that information required to be disclosed by us in reports that we file or submit under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in SEC rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

Management’s Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate “internal control over financial reporting,” as defined in Exchange Act Rule 13a-15(f) and 15d-15(f). We also carried out an evaluation, under the supervision and with the participation of management, including our Chief Executive Officer and Chief Financial Officer, of the

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effectiveness of our internal control over financial reporting as of December 31, 2018 based on the criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”). Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with U.S. GAAP. Based on such evaluation, our management concluded that our internal control over financial reporting was effective as of December 31, 2018. The effectiveness of our internal control over financial reporting as of December 31, 2018 has also been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in its report which appears herein.

Changes in Internal Control over Financial Reporting

We also carried out an evaluation, under the supervision and with the participation of management, including our Chief Executive Officer and Chief Financial Officer, of our “internal control over financial reporting” to determine whether any changes in our internal control over financial reporting occurred during the quarter ended December 31, 2018 that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. Based on that evaluation, there were no such changes in our internal control over financial reporting that occurred during the quarter ended December 31, 2018.

Limitations on the Effectiveness of Controls

Control systems, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control systems’ objectives are being met. Further, the design of any system of controls must reflect the fact that there are resource constraints, and the benefits of all controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within our Company have been detected. These inherent limitations include the realities that judgments in decision-making can be faulty and that breakdowns can occur because of error or mistake. Control systems can also be circumvented by the individual acts of some persons, by collusion of two or more people, or by management override of the controls. The design of any system of controls is also based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions. Over time, controls may become inadequate because of changes in conditions or deterioration in the degree of compliance with policies or procedures.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers, and Corporate Governance

For information with respect to our executive officers, see Item 1. “Business – Executive Officers of the Registrant.” Information concerning our board of directors and audit committee of our board of directors will appear in our 2019 Proxy Statement, under the sections entitled “Directors” and “Corporate Governance,” and information concerning Section 16(a) beneficial ownership reporting compliance will appear in our 2019 Proxy Statement under the section entitled “Section 16(a) Beneficial Ownership Reporting Compliance.” We have adopted a Code of Business Conduct and Ethics that applies to all directors, officers, and associates of First Solar. Information concerning this code will appear in our 2019 Proxy Statement under the section entitled “Corporate Governance.” The information in such sections of the Proxy Statement is incorporated by reference into this Annual Report on Form 10-K.

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Item 11. Executive Compensation

Information concerning executive compensation and related information will appear in our 2019 Proxy Statement under the section entitled "Executive Compensation," and information concerning the compensation committee of our board of directors will appear under "Corporate Governance" and "Compensation Committee Report." The information in such sections of the 2019 Proxy Statement is incorporated by reference into this Annual Report on Form 10-K.

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

Information concerning the security ownership of certain beneficial owners and management and related stockholder matters, including certain information regarding our equity compensation plans, will appear in our 2019 Proxy Statement under the section entitled "Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters." The information in such section of the Proxy Statement is incorporated by reference into this Annual Report on Form 10-K.

Equity Compensation Plans

The following table sets forth certain information as of December 31, 2018 concerning securities authorized for issuance under our equity compensation plans:

Plan Category	Number of Securities to be Issued Upon Exercise of Outstanding Options and Rights (a)(1)	Weighted-Average Exercise Price of Outstanding Options and Rights (b)(2)	Number of Securities Remaining Available for Future Issuance Under Equity Compensation Plans (Excluding Securities Reflected in Column (a)) (c)(3)
Equity compensation plans approved by stockholders	2,474,287	$ —	3,540,439
Equity compensation plans not approved by stockholders	—	—	—
Total	2,474,287	$ —	3,540,439

(1) Includes 2,474,287 shares issuable upon vesting of restricted stock units ("RSUs") granted under our 2010 and 2015 Omnibus Incentive Compensation Plans.

(2) The weighted-average exercise price does not take into account the shares issuable upon vesting of outstanding RSUs, which have no exercise price.

(3) Includes 579,566 shares of common stock reserved for future issuance under our stock purchase plan for employees.

See Note 18. "Share-Based Compensation" to our consolidated financial statements for further discussion on our equity compensation plans.

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

Information concerning certain relationships and related party transactions will appear in our 2019 Proxy Statement under the section entitled "Certain Relationships and Related Party Transactions," and information concerning director independence will appear in our 2019 Proxy Statement under the section entitled "Corporate Governance." The information in such sections of the Proxy Statement is incorporated by reference into this Annual Report on Form 10-K.

Item 14. Principal Accounting Fees and Services

Information concerning principal accounting fees and services and the audit committee of our board of directors' pre-approval policies and procedures for these items will appear in our 2019 Proxy Statement under the section entitled "Principal Accounting Fees and Services." The information in such section of the Proxy Statement is incorporated by reference into this Annual Report on Form 10-K.

PART IV

Item 15. Exhibits and Financial Statement Schedules

(a) Documents. The following documents are filed as part of this Annual Report on Form 10-K:

Report of Independent Registered Public Accounting Firm
Consolidated Balance Sheets
Consolidated Statements of Operations
Consolidated Statements of Comprehensive Income
Consolidated Statements of Stockholders' Equity
Consolidated Statements of Cash Flows
Notes to Consolidated Financial Statements

(b) Exhibits. Unless otherwise noted, the exhibits listed on the accompanying Index to Exhibits are filed with or incorporated by reference into this Annual Report on Form 10-K.

(c) Financial Statement Schedules. All financial statement schedules have been omitted as the required information is not applicable or is not material to require presentation of the schedule, or because the information required is included in the consolidated financial statements and notes thereto of this Annual Report on Form 10-K.

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of First Solar, Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of First Solar, Inc. and its subsidiaries ("the Company") as of December 31, 2018 and 2017, and the related consolidated statements of operations, comprehensive income, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2018, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO").

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the COSO.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the United States federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

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

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

Definition and Limitations of Internal Control over Financial Reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance

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

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

/s/ PricewaterhouseCoopers LLP

Phoenix, Arizona
February 21, 2019

We have served as the Company's or its predecessor's auditor since 2000, which includes periods before the Company became subject to SEC reporting requirements.

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FIRST SOLAR, INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(In thousands, except share data)

	December 31, 2018	2017
ASSETS		
Current assets:		
Cash and cash equivalents	$1,403,562	$2,268,534
Marketable securities	1,143,704	720,379
Accounts receivable trade, net	128,282	211,797
Accounts receivable, unbilled and retainage	458,166	174,608
Inventories	387,912	172,370
Balance of systems parts	56,906	28,840
Project assets	37,930	77,931
Notes receivable, affiliate	—	20,411
Prepaid expenses and other current assets	243,061	157,902
Total current assets	3,859,523	3,832,772
Property, plant and equipment, net	1,756,211	1,154,537
PV solar power systems, net	308,640	417,108
Project assets	460,499	424,786
Deferred tax assets, net	77,682	51,417
Restricted cash and investments	318,390	424,783
Equity method investments	3,186	217,230
Goodwill	14,462	14,462
Intangible assets, net	74,162	80,227
Inventories	130,083	113,277
Notes receivable, affiliates	22,832	48,370
Other assets	95,692	85,532
Total assets	$7,121,362	$6,864,501
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$233,287	$120,220
Income taxes payable	20,885	19,581
Accrued expenses	441,580	366,827
Current portion of long-term debt	5,570	13,075
Deferred revenue	129,755	81,816
Other current liabilities	14,380	48,757
Total current liabilities	845,457	650,276
Accrued solar module collection and recycling liability	134,442	166,609
Long-term debt	461,221	380,465
Other liabilities	467,839	568,454
Total liabilities	1,908,959	1,765,804
Commitments and contingencies		
Stockholders' equity:		
Common stock, $0.001 par value per share; 500,000,000 shares authorized; 104,885,261 and 104,468,460 shares issued and outstanding at December 31, 2018 and 2017, respectively	105	104
Additional paid-in capital	2,825,211	2,799,107
Accumulated earnings	2,441,553	2,297,227

Accumulated other comprehensive (loss) income	(54,466)	2,259
Total stockholders' equity	5,212,403	5,098,697
Total liabilities and stockholders' equity	$7,121,362	$6,864,501

See accompanying notes to these consolidated financial statements.

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FIRST SOLAR, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS
(In thousands, except per share amounts)

	Years Ended December 31,		
	2018	2017	2016
Net sales	$2,244,044	$2,941,324	$2,904,563
Cost of sales	1,851,867	2,392,377	2,266,145
Gross profit	392,177	548,947	638,418
Operating expenses:			
Selling, general and administrative	176,857	202,699	261,994
Research and development	84,472	88,573	124,762
Production start-up	90,735	42,643	1,021
Restructuring and asset impairments	—	37,181	743,862
Goodwill impairment	—	—	74,930
Total operating expenses	352,064	371,096	1,206,569
Operating income (loss)	40,113	177,851	(568,151)
Foreign currency loss, net	(570)	(9,640)	(14,007)
Interest income	59,788	35,704	25,193
Interest expense, net	(25,921)	(25,765)	(20,538)
Other income, net	39,737	23,965	40,252
Income (loss) before taxes and equity in earnings	113,147	202,115	(537,251)
Income tax expense	(3,441)	(371,996)	(23,167)
Equity in earnings, net of tax	34,620	4,266	144,306
Net income (loss)	$144,326	$(165,615)	$(416,112)
Net income (loss) per share:			
Basic	$1.38	$(1.59)	$(4.05)
Diluted	$1.36	$(1.59)	$(4.05)
Weighted-average number of shares used in per share calculations:			
Basic	104,745	104,328	102,866
Diluted	106,113	104,328	102,866

See accompanying notes to these consolidated financial statements.

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FIRST SOLAR, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(In thousands)

	Years Ended December 31,		
	2018	2017	2016
Net income (loss)	$144,326	$(165,615)	$(416,112)
Other comprehensive (loss) income:			
Foreign currency translation adjustments	(1,034)	11,832	(7,409)
Unrealized (loss) gain on marketable securities and restricted investments, net of tax of $3,735, $(588), and $2,518	(57,747)	3,217	(21,713)
Unrealized gain (loss) on derivative instruments, net of tax of $(996), $1,396, and $(691)	2,056	(2,883)	3,735
Other comprehensive (loss) income	(56,725)	12,166	(25,387)
Comprehensive income (loss)	$87,601	$(153,449)	$(441,499)

See accompanying notes to these consolidated financial statements.

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FIRST SOLAR, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In thousands)

	Common Stock		Additional Paid-In Capital	Accumulated Earnings	Accumulated Other Comprehensive (Loss) Income	Total Equity
	Shares	Amount				
Balance at December 31, 2015	101,767	$ 102	$2,748,894	$2,853,920	$ 15,480	$5,618,396
Cumulative-effect adjustment for the adoption of ASU 2016-09	—	—	2,420	25,034	—	27,454
Net loss	—	—	—	(416,112)	—	(416,112)
Other comprehensive loss	—	—	—	—	(25,387)	(25,387)
Common stock issued for share-based compensation	2,574	2	6,318	—	—	6,320
Tax withholding related to vesting of restricted stock	(306)	—	(20,407)	—	—	(20,407)
Share-based compensation expense	—	—	28,085	—	—	28,085
Balance at December 31, 2016	104,035	104	2,765,310	2,462,842	(9,907)	5,218,349
Net loss	—	—	—	(165,615)	—	(165,615)
Other comprehensive income	—	—	—	—	12,166	12,166
Common stock issued for share-based compensation	580	—	4,474	—	—	4,474
Tax withholding related to vesting of restricted stock	(147)	—	(5,137)	—	—	(5,137)
Share-based compensation expense	—	—	34,460	—	—	34,460
Balance at December 31, 2017	104,468	104	2,799,107	2,297,227	2,259	5,098,697
Net income	—	—	—	144,326	—	144,326
Other comprehensive loss	—	—	—	—	(56,725)	(56,725)
Common stock issued for share-based compensation	588	1	3,425	—	—	3,426
Tax withholding related to vesting of restricted stock	(171)	—	(11,175)	—	—	(11,175)
Share-based compensation expense	—	—	33,854	—	—	33,854
Balance at December 31, 2018	104,885	$ 105	$2,825,211	$2,441,553	$ (54,466)	$5,212,403

See accompanying notes to these consolidated financial statements.

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FIRST SOLAR, INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)

	Years Ended December 31,		
	2018	2017	2016
Cash flows from operating activities:			
Net income (loss)	$144,326	$(165,615)	$(416,112)
Adjustments to reconcile net income (loss) to cash (used in) provided by operating activities:			
Depreciation, amortization and accretion	130,736	115,313	230,940
Impairments and net losses on disposal of long-lived assets	8,065	35,364	838,467
Share-based compensation	34,154	35,121	28,712
Equity in earnings, net of tax	(34,620)	(4,266)	(144,306)
Distributions received from equity method investments	12,394	23,042	18,562
Remeasurement of monetary assets and liabilities	8,740	(15,823)	5,442
Deferred income taxes	(10,112)	173,368	90,555
Gains on sales of marketable securities and restricted investments	(55,405)	(49)	(41,632)
Noncash consideration from the sale of systems	—	—	(20,091)
Liabilities assumed by customers for the sale of systems	(240,865)	(24,203)	—
Other, net	2,121	2,339	13,863
Changes in operating assets and liabilities:			
Accounts receivable, trade, unbilled and retainage	(202,298)	85,760	178,894
Prepaid expenses and other current assets	(53,488)	26,680	9,269
Inventories and balance of systems parts	(257,229)	212,758	95,785
Project assets and PV solar power systems	49,939	981,273	(571,655)
Other assets	(11,920)	(1,269)	(19,245)
Income tax receivable and payable	(49,169)	169,079	(61,383)
Accounts payable	96,443	(47,191)	(191,642)
Accrued expenses and other liabilities	132,382	(258,028)	158,693
Accrued solar module collection and recycling liability	(31,003)	(2,976)	3,637
Net cash (used in) provided by operating activities	(326,809)	1,340,677	206,753
Cash flows from investing activities:			
Purchases of property, plant and equipment	(739,838)	(514,357)	(229,452)
Purchases of marketable securities and restricted investments	(1,369,036)	(580,971)	(422,609)
Proceeds from sales and maturities of marketable securities and restricted investments	1,135,984	466,309	525,515
Proceeds from sales of equity method investments	247,595	—	291,502
Payments received on notes receivable, affiliates	48,729	1,740	3,053
Other investing activities	(6,148)	477	(23,489)
Net cash (used in) provided by investing activities	(682,714)	(626,802)	144,520
Cash flows from financing activities:			
Repayment of borrowings under revolving credit facility	—	—	(550,000)
Proceeds from borrowings under revolving credit facility	—	—	550,000
Repayment of long-term debt	(18,937)	(24,078)	(137,367)
Proceeds from borrowings under long-term debt, net of discounts and issuance costs	290,925	215,415	26,816
Payments of tax withholdings for restricted shares	(11,175)	(5,137)	(20,407)
Proceeds from commercial letters of credit	—	43,025	—
Contingent consideration payments and other financing activities	(5,585)	(37,180)	(5,435)

Net cash provided by (used in) financing activities	255,228	192,045	(136,393)
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(13,558)	8,866	(6,306)
Net (decrease) increase in cash, cash equivalents and restricted cash	(767,853)	914,786	208,574
Cash, cash equivalents and restricted cash, beginning of the period	2,330,476	1,415,690	1,207,116
Cash, cash equivalents and restricted cash, end of the period	$1,562,623	$2,330,476	$1,415,690
Supplemental disclosure of noncash investing and financing activities:			
Property, plant and equipment acquisitions funded by liabilities	$138,270	$164,946	$28,687
Sale of system previously accounted for as sale-leaseback financing	$31,992	$—	$—
Acquisitions currently or previously funded by liabilities and contingent consideration	$2,915	$9,315	$30,092
Accrued interest capitalized to long-term debt	$3,512	$18,401	$—
Sale of equity method investment funded by note receivable, affiliate	$—	$—	$50,000

See accompanying notes to these consolidated financial statements.

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FIRST SOLAR, INC. AND SUBSIDIARIES

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. First Solar and Its Business

We are a leading global provider of comprehensive PV solar energy solutions. We design, manufacture, and sell PV solar modules with an advanced thin film semiconductor technology and also develop, design, construct, and sell PV solar power systems that primarily use the modules we manufacture. Additionally, we provide O&M services to system owners. We have substantial, ongoing R&D efforts focused on module and system-level innovations. We are the world's largest thin film PV solar module manufacturer and one of the world's largest PV solar module manufacturers.

2. Summary of Significant Accounting Policies

Basis of Presentation. These consolidated financial statements include the accounts of First Solar, Inc. and its subsidiaries and are prepared in accordance with U.S. GAAP. We eliminated all intercompany transactions and balances during consolidation. Certain prior year balances were reclassified to conform to the current year presentation.

Use of Estimates. The preparation of consolidated financial statements in conformity with U.S. GAAP requires us to make estimates and assumptions that affect the amounts reported in our consolidated financial statements and the accompanying notes. On an ongoing basis, we evaluate our estimates, including those related to inputs used to recognize revenue over time, accrued solar module collection and recycling liabilities, product warranties, accounting for income taxes, long-lived asset impairments, and testing goodwill. Despite our intention to establish accurate estimates and reasonable assumptions, actual results could differ materially from such estimates and assumptions.

Fair Value Measurements. We measure certain assets and liabilities at fair value, which is defined as the price that would be received from the sale of an asset or paid to transfer a liability (i.e., an exit price) on the measurement date in an orderly transaction between market participants in the principal or most advantageous market for the asset or liability. Our fair value measurements use the following hierarchy, which prioritizes valuation inputs based on the extent to which the inputs are observable in the market.

- Level 1 – Valuation techniques in which all significant inputs are unadjusted quoted prices from active markets for assets or liabilities that are identical to the assets or liabilities being measured.

- Level 2 – Valuation techniques in which significant inputs include quoted prices from active markets for assets or liabilities that are similar to the assets or liabilities being measured and/or quoted prices for assets or liabilities that are identical or similar to the assets or liabilities being measured from markets that are not active. Also, model-derived valuations in which all significant inputs are observable in active markets are Level 2 valuation techniques.

- Level 3 – Valuation techniques in which one or more significant inputs are unobservable. Such inputs reflect our estimate of assumptions that market participants would use to price an asset or liability.

Cash and Cash Equivalents. We consider highly liquid investments with original maturities of three months or less at the time of purchase to be cash equivalents with the exception of time deposits, which are presented as marketable securities.

Restricted Cash. Restricted cash consists of cash and cash equivalents held by various banks to secure certain of our letters of credit and other such deposits designated for the construction or operation of systems projects as well as the payment of amounts related to project specific debt financings. Restricted cash also includes cash and cash equivalents held in custodial accounts to fund the estimated future costs of our solar module collection and recycling obligations.

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Restricted cash for our letters of credit is classified as current or noncurrent based on the maturity date of the corresponding letter of credit. Restricted cash for project construction, operation, and financing is classified as current or noncurrent based on the intended use of the restricted funds. Restricted cash held in custodial accounts is classified as noncurrent to align with the nature of the corresponding collection and recycling liabilities.

Marketable Securities and Restricted Investments. We determine the classification of our marketable securities and restricted investments at the time of purchase and reevaluate such designation at each balance sheet date. As of December 31, 2018 and 2017, all of our marketable securities and restricted investments were classified as available-for-sale debt securities. Accordingly, we record them at fair value and account for the net unrealized gains and losses as part of “Accumulated other comprehensive (loss) income” until realized. We record realized gains and losses on the sale of our marketable securities and restricted investments in “Other income, net” computed using the specific identification method.

We may sell marketable securities prior to their stated maturities after consideration of our liquidity requirements. We view unrestricted securities with maturities beyond 12 months as available to support our current operations and, accordingly, classify such securities as current assets under “Marketable securities” in the consolidated balance sheets. Restricted investments consist of long-term duration marketable securities that we hold in custodial accounts to fund the estimated future costs of our solar module collection and recycling obligations. Accordingly, we classify restricted investments as noncurrent assets under “Restricted cash and investments” in the consolidated balance sheets.

All of our available-for-sale marketable securities and restricted investments are subject to a periodic impairment review. We consider a marketable security or restricted investment to be impaired when its fair value is less than its cost basis, in which case we would further review the security or investment to determine if it is other-than-temporarily impaired. In performing such an evaluation, we review factors such as the length of time and the extent to which its fair value has been below its cost basis, the financial condition of the issuer and any changes thereto, our intent to sell, and whether it is more likely than not that we will be required to sell the marketable security or restricted investment before we have recovered its cost basis. If a marketable security or restricted investment were other-than-temporarily impaired, we write it down through “Other income, net” to its impaired value and establish that value as its new cost basis.

Accounts Receivable Trade and Allowance for Doubtful Accounts. We record trade accounts receivable for our unconditional rights to consideration arising from our performance under contracts with customers. The carrying value of such receivables, net of the allowance for doubtful accounts, represents their estimated net realizable value. We estimate our allowance for doubtful accounts for specific trade receivable balances based on historical collection trends, the age of outstanding trade receivables, existing economic conditions, and the financial security, if any, associated with the receivables. Past-due trade receivable balances are written off when our internal collection efforts have been unsuccessful.

Our module and other equipment sales generally include up to 45-day payment terms following the transfer of control of the products to the customer. In addition, certain module and equipment sale agreements may require a down payment for a portion of the transaction price upon or shortly after entering into the agreement or related purchase order. Payment terms for sales of our solar power systems, EPC services, and operations and maintenance services vary by contract but are generally due upon demand or within several months of satisfying the associated performance obligations. As a practical expedient, we do not adjust the promised amount of consideration for the effects of a significant financing component when we expect, at contract inception, that the period between our transfer of a promised product or service to a customer and when the customer pays for that product or service will be one year or less. We typically do not include extended payment terms in our contracts with customers.

Accounts Receivable, Unbilled. Accounts receivable, unbilled represents a contract asset for revenue that has been recognized in advance of billing the customer, which is common for long-term construction contracts. For example, we typically recognize revenue from contracts for the construction and sale of PV solar power systems over time using cost based input methods, which recognize revenue and gross profit as work is performed based on the relationship between actual costs incurred compared to the total estimated costs of the contract. Accordingly, revenue could be

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recognized in advance of billing the customer, resulting in an amount recorded to “Accounts receivable, unbilled and retainage.” Once we have an unconditional right to consideration under a construction contract, we typically bill our customer and reclassify the “Accounts receivable, unbilled and retainage” to “Accounts receivable trade, net.” Billing requirements vary by contract but are generally structured around the completion of certain construction milestones. We assess our unbilled accounts receivable for impairment in accordance with the allowance for doubtful accounts policy described above.

Retainage. Certain of our EPC contracts for PV solar power systems we build contain retainage provisions. Retainage represents a contract asset for the portion of the contract price earned by us for work performed, but held for payment by the customer as a form of security until we reach certain construction milestones. We consider whether collectibility of such retainage is reasonably assured in connection with our overall assessment of the collectibility of amounts due or that will become due under our EPC contracts. Retainage included within “Accounts receivable, unbilled and retainage” is expected to be billed and collected within the next 12 months. After we satisfy the EPC contract requirements and have an unconditional right to consideration, we typically bill for retainage and reclassify such amounts to “Accounts receivable trade, net.”

Inventories – Current and Noncurrent. We report our inventories at the lower of cost or net realizable value. We determine cost on a first-in, first-out basis and include both the costs of acquisition and the costs of manufacturing in our inventory costs. These costs include direct materials, direct labor, and indirect manufacturing costs, including depreciation and amortization. Our capitalization of costs into inventory is based on the normal utilization of our plants. If our plant utilization is abnormally low, the portion of our indirect manufacturing costs related to the abnormal utilization level is expensed as incurred. Other abnormal manufacturing costs, such as wasted materials or excess yield losses, are also expensed as incurred. Finished goods inventory is comprised exclusively of solar modules that have not yet been installed in a PV solar power plant under construction or sold to a third-party customer.

As needed, we may purchase a critical raw material that is used in our core production process in quantities that exceed anticipated consumption within our normal operating cycle (which is 12 months). We classify such raw materials that we do not expect to consume within our normal operating cycle as noncurrent.

We regularly review the cost of inventories, including noncurrent inventories, against their estimated net realizable value and record write-downs if any inventories have costs in excess of their net realizable values. We also regularly evaluate the quantities and values of our inventories, including noncurrent inventories, in light of current market conditions and trends, among other factors, and record write-downs for any quantities in excess of demand or for any obsolescence. This evaluation considers the use of modules in our systems business, expected demand, anticipated sales prices, strategic raw material requirements, new product development schedules, product obsolescence, product merchantability, and other factors. Market conditions are subject to change, and actual consumption of our inventory could differ from forecasted demand.

Balance of Systems Parts. BoS parts represent mounting, electrical, and other construction parts purchased for PV solar power systems to be constructed or currently under construction, which are not yet installed in a system. These construction parts include items such as posts, tilt brackets, tables, harnesses, combiner boxes, inverters, cables, tracker equipment, and other parts that we may purchase or assemble for the systems we construct. We carry these parts at the lower of cost or net realizable value and determine our BoS costs on a weighted-average basis. BoS parts do not include any solar modules that we manufacture.

Property, Plant and Equipment. We report our property, plant and equipment at cost, less accumulated depreciation. Cost includes the price paid to acquire or construct the assets, required installation costs, interest capitalized during the construction period, and any expenditures that substantially add to the value of or substantially extend the useful life of the assets. We capitalize costs related to computer software obtained or developed for internal use, which generally includes enterprise-level business and finance software that we customize to meet our specific operational requirements. We expense repair and maintenance costs at the time we incur them.

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We begin depreciation for our property, plant and equipment when they are placed in service. We consider such assets to be placed in service when they are both in the location and condition for their intended use. We compute depreciation expense using the straight-line method over the estimated useful lives of assets, as presented in the table below. We depreciate leasehold improvements over the shorter of their estimated useful lives or the remaining term of the lease. The estimated useful life of an asset is reassessed whenever applicable facts and circumstances indicate a change in the estimated useful life of such asset has occurred.

	Useful Lives in Years
Buildings and building improvements	25 – 40
Manufacturing machinery and equipment	5 – 10
Furniture, fixtures, computer hardware, and computer software	3 – 7
Leasehold improvements	up to 15

PV Solar Power Systems. PV solar power systems represent project assets that we may temporarily own and operate after being placed in service. We report our PV solar power systems at cost, less accumulated depreciation. When we are entitled to incentive tax credits for our systems, we reduce the related carrying value of the assets by the amount of the tax credits, which reduces future depreciation. We begin depreciation for PV solar power systems when they are placed in service. We compute depreciation expense for the systems using the straight-line method over the shorter of the term of the related PPA or 25 years. Accordingly, our current PV solar power systems have estimated useful lives ranging from 19 to 25 years.

Project Assets. Project assets primarily consist of costs related to solar power projects in various stages of development that are capitalized prior to the completion of the sale of the project, including projects that may have begun commercial operation under PPAs and are actively marketed and intended to be sold. These project related costs include costs for land, development, and construction of a PV solar power system. Development costs may include legal, consulting, permitting, transmission upgrade, interconnection, and other similar costs. We typically classify project assets as noncurrent due to the nature of solar power projects (long-lived assets) and the time required to complete all activities to develop, construct, and sell projects, which is typically longer than 12 months. Once we enter into a definitive sales agreement, we classify such project assets as current until the sale is completed and we have met all of the criteria to recognize the sale as revenue. Any income generated by a project while it remains within project assets is accounted for as a reduction to our basis in the project. If a project is completed and begins commercial operation prior to the closing of a sales arrangement, the completed project will remain in project assets until placed in service. We present all expenditures related to the development and construction of project assets, whether fully or partially owned, as a component of cash flows from operating activities.

We review project assets for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. We consider a project commercially viable or recoverable if it is anticipated to be sold for a profit once it is either fully developed or fully constructed. We consider a partially developed or partially constructed project commercially viable or recoverable if the anticipated selling price is higher than the carrying value of the related project assets. We examine a number of factors to determine if the project is expected to be recoverable, including whether there are any changes in environmental, permitting, market pricing, regulatory, or other conditions that may impact the project. Such changes could cause the costs of the project to increase or the selling price of the project to decrease. If a project is not considered recoverable, we impair the respective project assets and adjust the carrying value to the estimated fair value, with the resulting impairment recorded within “Selling, general and administrative” expense.

Interest Capitalization. We capitalize interest as part of the historical cost of acquiring or constructing certain assets, including property, plant and equipment; project assets; and PV solar power systems. Interest capitalized for property, plant and equipment or PV solar power systems is depreciated over the estimated useful life of the related assets when they are placed in service. We charge interest capitalized for project assets to cost of sales when such assets are sold and we have met all revenue recognition criteria. We capitalize interest to the extent that interest cost has been incurred

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and payments have been made to acquire, construct, or develop an asset. We cease capitalization of interest for assets in development or under construction if the assets are substantially complete or if we have sold such assets.

Asset Impairments. We assess long-lived assets classified as “held and used,” including our property, plant and equipment; project assets; PV solar power systems; and intangible assets for impairment whenever events or changes in circumstances arise, including consideration of technological obsolescence, that may indicate that the carrying amount of such assets may not be recoverable. These events and changes in circumstances may include a significant decrease in the market price of a long-lived asset; a significant adverse change in the extent or manner in which a long-lived asset is being used or in its physical condition; a significant adverse change in the business climate that could affect the value of a long-lived asset; an accumulation of costs significantly in excess of the amount originally expected for the acquisition or construction of a long-lived asset; a current-period operating or cash flow loss combined with a history of such losses or a projection of future losses associated with the use of a long-lived asset; or a current expectation that, more likely than not, a long-lived asset will be sold or otherwise disposed of significantly before the end of its previously estimated useful life. For purposes of recognition and measurement of an impairment loss, long-lived assets are grouped with other assets and liabilities at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities.

When impairment indicators are present, we compare undiscounted future cash flows, including the eventual disposition of the asset group at market value, to the asset group’s carrying value to determine if the asset group is recoverable. If the carrying value of the asset group exceeds the undiscounted future cash flows, we measure any impairment by comparing the fair value of the asset group to its carrying value. Fair value is generally determined by considering (i) internally developed discounted cash flows for the asset group, (ii) third-party valuations, and/or (iii) information available regarding the current market value for such assets. If the fair value of an asset group is determined to be less than its carrying value, an impairment in the amount of the difference is recorded in the period that the impairment indicator occurs. Estimating future cash flows requires significant judgment, and such projections may vary from the cash flows eventually realized.

We consider a long-lived asset to be abandoned after we have ceased use of such asset and we have no intent to use or repurpose the asset in the future. Abandoned long-lived assets are recorded at their salvage value, if any.

We classify long-lived assets we plan to sell, excluding project assets and PV solar power systems, as held for sale on our consolidated balance sheets only after certain criteria have been met including: (i) management has the authority and commits to a plan to sell the asset, (ii) the asset is available for immediate sale in its present condition, (iii) an active program to locate a buyer and the plan to sell the asset have been initiated, (iv) the sale of the asset is probable within 12 months, (v) the asset is being actively marketed at a reasonable sales price relative to its current fair value, and (vi) it is unlikely that the plan to sell will be withdrawn or that significant changes to the plan will be made. We record assets held for sale at the lower of their carrying value or fair value less costs to sell. If, due to unanticipated circumstances, such assets are not sold in the 12 months after being classified as held for sale, then held for sale classification will continue as long as the above criteria are still met.

Ventures and Variable Interest Entities. In the normal course of business, we establish wholly owned project companies which may be considered variable interest entities (“VIEs”). We consolidate wholly owned VIEs when we are considered the primary beneficiary of such entities. Additionally, we have, and may in the future form, joint venture type arrangements, including partnerships and partially owned limited liability companies or similar legal structures, with one or more third parties primarily to develop, construct, own, and/or sell solar power projects. We analyze all of our ventures and classify them into two groups: (i) ventures that must be consolidated because they are either not VIEs and we hold a majority voting interest, or because they are VIEs and we are the primary beneficiary and (ii) ventures that do not need to be consolidated because they are either not VIEs and we hold a minority voting interest, or because they are VIEs and we are not the primary beneficiary.

Ventures are considered VIEs if (i) the total equity investment at risk is not sufficient to permit the entity to finance its activities without additional subordinated financial support; (ii) as a group, the holders of the equity investment at risk lack the ability to make certain decisions, the obligation to absorb expected losses, or the right to receive expected residual returns; or (iii) an equity investor has voting rights that are disproportionate to its economic interest and substantially all of the entity's activities are conducted on behalf of that investor. Our venture agreements typically require us to fund some form of capital for the development and construction of a project, depending upon the opportunity and the market in which our ventures are located.

We are considered the primary beneficiary of and are required to consolidate a VIE if we have the power to direct the activities that most significantly impact the VIE's economic performance and the obligation to absorb losses or the right to receive benefits of the VIE that could potentially be significant to the entity. If we determine that we do not have the power to direct the activities that most significantly impact the entity, then we are not the primary beneficiary of the VIE.

Equity Method Investments. We use the equity method of accounting for our investments when we have the ability to significantly influence, but not control, the operations or financial activities of the investee. As part of this evaluation, we consider our participating and protective rights in the venture as well as its legal form. We record our equity method investments at cost and subsequently adjust their carrying amount each period for our share of the earnings or losses of the investee and other adjustments required by the equity method of accounting. Distributions received from our equity method investments are recorded as reductions in the carrying value of such investments and are classified on the consolidated statements of cash flows pursuant to the cumulative earnings approach. Under this approach, distributions received are considered returns on investment and are classified as cash inflows from operating activities unless our cumulative distributions received, less distributions received in prior periods that were determined to be returns of investment, exceed our cumulative equity in earnings recognized from the investment. When such an excess occurs, the current period distributions up to this excess are considered returns of investment and are classified as cash inflows from investing activities.

We monitor equity method investments for impairment and record reductions in their carrying values if the carrying amount of an investment exceeds its fair value. An impairment charge is recorded when such impairment is deemed to be other-than-temporary. To determine whether an impairment is other-than-temporary, we consider our ability and intent to hold the investment until the carrying amount is fully recovered. Circumstances that indicate an other-than-temporary impairment may have occurred include factors such as decreases in quoted market prices or declines in the operations of the investee. The evaluation of an investment for potential impairment requires us to exercise significant judgment and to make certain assumptions. The use of different judgments and assumptions could result in different conclusions. We recorded impairment losses related to our equity method investments of $3.5 million, $2.0 million, and $0.6 million, net of tax, during the years ended December 31, 2018, 2017, and 2016, respectively.

Goodwill. Goodwill represents the excess of the purchase price of acquired businesses over the estimated fair value assigned to the individual assets acquired and liabilities assumed. We do not amortize goodwill, but instead are required to test goodwill for impairment at least annually. We perform impairment tests between the scheduled annual test in the fourth quarter if facts and circumstances indicate that it is more likely than not that the fair value of a reporting unit that has goodwill is less than its carrying value.

We may first make a qualitative assessment of whether it is more likely than not that a reporting unit's fair value is less than its carrying value to determine whether it is necessary to perform a quantitative goodwill impairment test. Such qualitative impairment test considers various factors, including macroeconomic conditions, industry and market considerations, cost factors, the overall financial performance of a reporting unit, and any other relevant events affecting our company or a reporting unit. If we determine through the qualitative assessment that a reporting unit's fair value is more likely than not greater than its carrying value, the quantitative impairment test is not required. If the qualitative assessment indicates it is more likely than not that a reporting unit's fair value is less than its carrying value, we perform a quantitative impairment test. We may also elect to proceed directly to the quantitative impairment test without considering qualitative factors.

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The quantitative impairment test is the comparison of the fair value of a reporting unit with its carrying amount, including goodwill. Our reporting units consist of our modules business and our fully integrated systems business. We define the fair value of a reporting unit as the price that would be received to sell the unit as a whole in an orderly transaction between market participants at the measurement date. We primarily use an income approach to estimate the fair value of our reporting units. Significant judgment is required when estimating the fair value of a reporting unit, including the forecasting of future operating results and the selection of discount and expected future growth rates used to determine projected cash flows. If the estimated fair value of a reporting unit exceeds its carrying value, goodwill is not impaired, and no further analysis is required. Conversely, if the carrying value of a reporting unit exceeds its estimated fair value, we record an impairment loss equal to the excess, not to exceed the total amount of goodwill allocated to the reporting unit.

Intangible Assets. Intangible assets primarily include developed technologies or in-process research and development ("IPR&D") from prior business acquisitions, certain PPAs acquired after the associated PV solar power systems were placed in service, and our internally-generated intangible assets, substantially all of which were patents on technologies related to our products and production processes. We record an asset for patents after the patent has been issued based on the legal, filing, and other costs incurred to secure it. IPR&D is initially capitalized at fair value as an intangible asset with an indefinite life and periodically assessed for impairment. When the IPR&D project is complete, it is reclassified as a definite-lived intangible asset. We amortize intangible assets on a straight-line basis over their estimated useful lives, which generally range from 10 to 20 years.

Deferred Revenue. When we receive consideration, or such consideration is unconditionally due, from a customer prior to transferring goods or services to the customer under the terms of a sales contract, we record deferred revenue, which represents a contract liability. We recognize deferred revenue as net sales after we have transferred control of the goods or services to the customer and all revenue recognition criteria are met. As a practical expedient, we do not adjust the consideration in a contract for the effects of a significant financing component when we expect, at contract inception, that the period between a customer's down payment and our transfer of a promised product or service to the customer will be one year or less. Additionally, we do not adjust the consideration in a contract for the effects of a significant financing component when the consideration is received as a form of performance security.

Product Warranties. We provide a limited PV solar module warranty covering defects in materials and workmanship under normal use and service conditions for approximately 10 years. We also typically warrant that modules installed in accordance with agreed-upon specifications will produce at least 98% of their labeled power output rating during the first year, with the warranty coverage reducing by 0.5% every year thereafter throughout the approximate 25-year limited power output warranty period. In resolving claims under both the limited defect and power output warranties, we typically have the option of either repairing or replacing the covered modules or, under the limited power output warranty, providing additional modules to remedy the power shortfall. Our limited module warranties also include an option for us to remedy claims under such warranties, generally exercisable only after the second year of the warranty period, by making certain cash payments. Under the limited workmanship warranty, the optional cash payment will be equal to the original purchase price of the module, reduced by a degradation factor, and under the limited power output warranty, the cash payment will be equal to the shortfall in power output. Such limited module warranties are standard for module sales and may be transferred from the original purchasers of the solar modules to subsequent purchasers upon resale.

As an alternative form of our standard limited module power output warranty, we also offer an aggregated or system-level limited module performance warranty. This system-level limited module performance warranty is designed for utility-scale systems and provides 25-year system-level energy degradation protection. This warranty represents a practical expedient to address the challenge of identifying, from the potential millions of modules installed in a utility-scale system, individual modules that may be performing below warranty thresholds by focusing on the aggregate energy generated by the system rather than the power output of individual modules. The system-level limited module performance warranty is typically calculated as a percentage of a system's expected energy production, adjusted for certain actual site conditions, with the warranted level of performance declining each year in a linear fashion, but never falling below 80% during the term of the warranty. In resolving claims under the system-level limited module performance warranty to restore the system to warranted performance levels, we first must validate that the root cause of the issue is due to module performance; we then have the option of either repairing or replacing the covered modules, providing supplemental modules, or making a cash payment. Consistent with our limited module power output warranty, when we elect to satisfy a warranty claim by providing replacement or supplemental modules under the system-level module performance warranty, we do not have any obligation to pay for the labor to remove or install modules.

In addition to our limited solar module warranties described above, for PV solar power systems we construct, we typically provide limited warranties for defects in engineering design, installation, and BoS part workmanship for a period of one to two years following the substantial completion of a system or a block within the system. In resolving claims under such BoS warranties, we have the option of remedying the defect through repair or replacement.

When we recognize revenue for module or system sales, we accrue liabilities for the estimated future costs of meeting our limited warranty obligations. We make and revise these estimates based primarily on the number of our solar modules under warranty installed at customer locations, our historical experience with warranty claims, our monitoring of field installation sites, our internal testing of and the expected future performance of our solar modules and BoS parts, and our estimated per-module replacement costs.

Accrued Solar Module Collection and Recycling Liability. Historically, we have recognized expense at the time of sale for the estimated cost of our future obligations for collecting and recycling solar modules covered by our solar module collection and recycling program. See Note 13. “Solar Module Collection and Recycling Liability” for further information.

Asset Retirement Obligations. We develop, construct, and operate certain project assets and PV solar power systems with land lease agreements that include a requirement for the removal of the assets at the end of the lease. We also lease certain land for our manufacturing facilities and administrative offices under agreements that require the removal of our property or leasehold improvements upon termination of the lease.

We recognize such asset retirement obligations (“AROs”) in the period in which they are incurred based on the present value of estimated third-party decommissioning costs, and we capitalize the associated asset retirement costs as part of the carrying amount of the related assets. Once an asset is placed in service, the asset retirement cost is subsequently depreciated on a straight-line basis over the estimated useful life of the asset. Changes in AROs resulting from the passage of time are recognized as an increase in the carrying amount of the liability and as accretion expense. Our AROs were included within “Other liabilities” at December 31, 2018 and 2017 and totaled $18.9 million and $16.7 million, respectively.

Derivative Instruments. We recognize derivative instruments on our consolidated balance sheets at their fair value. On the date that we enter into a derivative contract, we designate the derivative instrument as a fair value hedge, a cash flow hedge, a hedge of a net investment in a foreign operation, or a derivative instrument that will not be accounted for using hedge accounting methods. As of December 31, 2018 and 2017, all of our derivative instruments were designated either as cash flow hedges or as derivative instruments not accounted for using hedge accounting methods.

We record changes in the fair value of a derivative instrument that is highly effective and that is designated and qualifies as a cash flow hedge in “Accumulated other comprehensive (loss) income” until our earnings are affected by the variability of the cash flows from the underlying hedge. We record any hedge ineffectiveness and amounts excluded from effectiveness testing in current period earnings within “Other income, net.” We report changes in the fair value of derivative instruments that are not designated or do not qualify for hedge accounting in current period earnings. We classify cash flows from derivative instruments on the consolidated statements of cash flows in the same category as the item being hedged or on a basis consistent with the nature of the instrument.

At the inception of a hedge, we formally document all relationships between hedging instruments and the underlying hedged items as well as our risk-management objective and strategy for undertaking the hedge transaction. We also formally assess (both at inception and on an ongoing basis) whether our derivative instruments are highly effective in offsetting changes in the fair value or cash flows of the underlying hedged items and whether those derivatives are expected to remain highly effective in future periods. When we determine that a derivative instrument is not highly effective as a hedge, we discontinue hedge accounting prospectively. In all situations in which we discontinue hedge accounting and the derivative instrument remains outstanding, we carry the derivative instrument at its fair value on our consolidated balance sheets and recognize subsequent changes in its fair value in current period earnings.

Business Combinations. We account for business combinations using the acquisition method of accounting and record intangible assets separate from goodwill. Such intangible assets are recorded at fair value based on estimates as of the date of acquisition. Goodwill is recorded as the residual amount of the purchase price consideration less the fair value assigned to the individual assets acquired and liabilities assumed as of the date of acquisition. We charge acquisition related costs that are not part of the purchase price consideration to "Selling, general and administrative" as they are incurred. These costs typically include transaction and integration costs, such as legal, accounting, and other professional fees. We account for any contingent consideration, which represents an obligation of the acquirer to transfer additional assets or equity interests to the former owner as part of the exchange if specified future events occur or conditions are met, at fair value either as a liability or as equity depending on the terms of the acquisition agreement.

Revenue Recognition – Module and Other Equipment Sales. We recognize revenue for module and other equipment sales (e.g., module plus arrangements) at a point in time following the transfer of control of such products to the customer, which typically occurs upon shipment or delivery depending on the terms of the underlying contracts. For module and other equipment sales contracts that contain multiple performance obligations, such as the shipment or delivery of solar modules and other BoS parts, we allocate the transaction price to each performance obligation identified in the contract based on relative standalone selling prices, or estimates of such prices, and recognize the related revenue as control of each individual product is transferred to the customer, in satisfaction of the corresponding performance obligations.

Revenue Recognition – Solar Power System Sales and/or EPC Services. We generally recognize revenue for sales of solar power systems and/or EPC services over time as our performance creates or enhances an energy generation asset controlled by the customer. Furthermore, the sale of a solar power system when combined with EPC services represents a single performance obligation for the development and construction of a single generation asset. For such sale arrangements, we recognize revenue using cost based input methods, which recognize revenue and gross profit as work is performed based on the relationship between actual costs incurred compared to the total estimated costs of the contract, after consideration of our customers' commitment to perform its obligations under the contract, which is typically measured through the receipt of cash deposits or other forms of financial security issued by creditworthy financial institutions or parent entities. For sales of solar power systems in which we obtain an interest in the project sold to the customer, we recognize all of the revenue for the consideration received, including the fair value of the noncontrolling interest we obtained, and defer any profit associated with the interest obtained through "Equity in earnings, net of tax." We may also recognize revenue for the sale of a solar power system after it has been completed due to the timing of when we enter into the associated sales contract with the customer.

In applying cost based input methods of revenue recognition, we use the actual costs incurred relative to the total estimated costs (including solar module costs) to determine our progress towards contract completion and to calculate the corresponding amount of revenue and gross profit to recognize. Cost based input methods of revenue recognition are considered a faithful depiction of our efforts to satisfy long-term construction contracts and therefore reflect the transfer of goods to a customer under such contracts. Costs incurred that do not contribute to satisfying our performance obligations ("inefficient costs") are excluded from our input methods of revenue recognition as the amounts are not reflective of our transferring control of the system to the customer. Costs incurred towards contract completion may include costs associated with solar modules, direct materials, labor, subcontractors, and other indirect costs related to contract performance. We recognize solar module and direct material costs as incurred when such items have been installed in a system.

Cost based input methods of revenue recognition require us to make estimates of net contract revenues and costs to complete our projects. In making such estimates, significant judgment is required to evaluate assumptions related to

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the amount of net contract revenues, including the impact of any performance incentives, liquidated damages, and other payments to customers. Significant judgment is also required to evaluate assumptions related to the costs to complete our projects, including materials, labor, contingencies, and other system costs. If the estimated total costs on any contract, including any inefficient costs, are greater than the net contract revenues, we recognize the entire estimated loss in the period the loss becomes known. The cumulative effect of revisions to estimates related to net contract revenues or costs to complete contracts are recorded in the period in which the revisions to estimates are identified and the amounts can be reasonably estimated. The effect of the changes on future periods are recognized as if the revised estimates had been used since revenue was initially recognized under the contract. Such revisions could occur in any reporting period, and the effects may be material depending on the size of the contracts or the changes in estimates.

As part of our solar power system sales, we conduct performance testing of a system prior to substantial completion to confirm the system meets its operational and capacity expectations noted in the EPC agreement. In addition, we may provide an energy performance test during the first or second year of a system's operation to demonstrate that the actual energy generation for the applicable period meets or exceeds the modeled energy expectation, after certain adjustments. In certain instances, a bonus payment may be received at the end of the applicable test period if the system performs above a specified level. Conversely, if there is an underperformance event with regards to these tests, we may incur liquidated damages as a percentage of the EPC contract price. Such performance guarantees represent a form of variable consideration and are estimated at contract inception at their most likely amount and updated at the end of each reporting period as additional performance data becomes available and only to the extent that it is probable that a significant reversal of any incremental revenue will not occur.

Revenue Recognition – Operations and Maintenance. We recognize revenue for standard, recurring O&M services over time as customers receive and consume the benefits of such services, which typically include 24/7 system monitoring, certain PPA and other agreement compliance, NERC compliance, large generator interconnection agreement compliance, energy forecasting, performance engineering analysis, regular performance reporting, turn-key maintenance services including spare parts and corrective maintenance repair, warranty management, and environmental services. Other ancillary O&M services, such as equipment replacement, weed abatement, landscaping, or solar module cleaning, are recognized as revenue as the services are provided and billed to the customer. Costs of O&M services are expensed in the period in which they are incurred.

As part of our O&M service offerings, we typically offer an effective availability guarantee, which stipulates that a system will be available to generate a certain percentage of total possible energy during a specific period after adjusting for factors outside of our control as the service provider. If system availability exceeds a contractual threshold, we may receive a bonus payment, or if system availability falls below a separate threshold, we may incur liquidated damages for certain lost energy under the PPA. Such bonuses or liquidated damages represent a form of variable consideration and are estimated and recognized over time as customers receive and consume the benefits of the O&M services.

Revenue Recognition – Energy Generation. We sell energy generated by PV solar power systems under PPAs or on an open contract basis. For energy sold under PPAs, which may qualify as a lease, we recognize revenue each period based on the volume of energy delivered to the customer (i.e., the PPA off-taker) and the price stated in the PPA. For energy sold on an open contract basis, we recognize revenue at the point in time the energy is delivered to the grid based on the prevailing spot market prices.

Shipping and Handling Costs. We account for shipping and handling activities related to contracts with customers as costs to fulfill our promise to transfer the associated products. Accordingly, we record amounts billed for shipping and handling costs as a component of net sales, and classify such costs as a component of cost of sales.

Taxes Collected from Customers and Remitted to Governmental Authorities. We exclude from our measurement of transaction prices all taxes assessed by governmental authorities that are both (i) imposed on and concurrent with a specific revenue-producing transaction and (ii) collected from customers. Accordingly, such tax amounts are not included as a component of net sales or cost of sales.

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Research and Development Expense. We incur research and development costs during the process of researching and developing new products and enhancing our existing products, technologies, and manufacturing processes. Our research and development costs consist primarily of employee compensation, materials, outside services, and depreciation. We expense these costs as incurred until the resulting product has been completed, tested, and made ready for commercial manufacturing.

Production Start-Up. Production start-up expense consists primarily of employee compensation and other costs associated with operating a production line before it has been qualified for full production, including the cost of raw materials for solar modules run through the production line during the qualification phase and applicable facility related costs. Costs related to equipment upgrades and implementation of manufacturing process improvements are also included in production start-up expense as well as costs related to the selection of a new site, related legal and regulatory costs, and costs to maintain our plant replication program to the extent we cannot capitalize these expenditures.

Restructuring and Exit Activities. We record costs associated with exit activities, such as one-time employee termination benefits, when management approves and commits to a plan of termination or over the future service period, if any. Other costs associated with exit activities may include contract termination costs, including costs related to leased facilities to be abandoned or subleased, and facility and employee relocation costs.

Share-Based Compensation. We recognize share-based compensation expense for the estimated grant-date fair value of equity awards issued as compensation to employees over the requisite service period, which is generally four years. For awards with performance conditions, we recognize share-based compensation expense if it is probable that the performance conditions will be achieved. We account for forfeitures of share-based awards as such forfeitures occur. Accordingly, when an associate's employment is terminated, all previously unvested awards granted to such associate are forfeited, which results in a benefit to share-based compensation expense in the period of such associate's termination equal to the cumulative expense recorded through the termination date for such unvested awards. We recognize share-based compensation expense for awards with graded vesting schedules on a straight-line basis over the requisite service periods for each separately vesting portion of the award as if each award was in substance multiple awards.

Foreign Currency Translation. The functional currencies of certain of our foreign subsidiaries are their local currencies. Accordingly, we apply period-end exchange rates to translate their assets and liabilities and daily transaction exchange rates to translate their revenues, expenses, gains, and losses into U.S. dollars. We include the associated translation adjustments as a separate component of "Accumulated other comprehensive (loss) income" within stockholders' equity. The functional currency of our subsidiaries in Canada, Chile, Malaysia, Singapore, and Vietnam is the U.S. dollar; therefore, we do not translate their financial statements. Gains and losses arising from the remeasurement of monetary assets and liabilities denominated in currencies other than a subsidiary's functional currency are included in "Foreign currency loss, net" in the period in which they occur.

Income Taxes. We use the asset and liability method to account for income taxes whereby we calculate deferred tax assets or liabilities using the enacted tax rates and tax law applicable to when any temporary differences are expected to reverse. We establish valuation allowances, when necessary, to reduce deferred tax assets to the extent it is more likely than not that such deferred tax assets will not be realized. We do not provide deferred taxes related to the U.S. GAAP basis in excess of the outside tax basis in the investment in our foreign subsidiaries to the extent such amounts relate to indefinitely reinvested earnings and profits of such foreign subsidiaries.

Income tax expense includes (i) deferred tax expense, which generally represents the net change in deferred tax assets or liabilities during the year plus any change in valuation allowances, and (ii) current tax expense, which represents the amount of tax currently payable to or receivable from taxing authorities. We only recognize tax benefits related to uncertain tax positions that are more likely than not of being sustained upon examination. For those positions that satisfy such recognition criteria, the amount of tax benefit that we recognize is the largest amount of tax benefit that is more likely than not of being sustained on ultimate settlement of the uncertain tax position.

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Per Share Data. Basic net income or loss per share is computed by dividing net income or loss by the weighted-average number of common shares outstanding for the period. Diluted net income per share is computed giving effect to all potentially dilutive common shares, including restricted and performance stock units and stock purchase plan shares, unless there is a net loss for the period. In computing diluted net income per share, we utilize the treasury stock method.

Accumulated Other Comprehensive Income or Loss. Our accumulated other comprehensive income or loss includes foreign currency translation adjustments, unrealized gains and losses on available-for-sale debt securities, and unrealized gains and losses on derivative instruments designated and qualifying as cash flow hedges. We record these components of accumulated other comprehensive income or loss net of tax and release such tax effects when the underlying components affect earnings.

3. Recent Accounting Pronouncements

In February 2018, the Financial Accounting Standard Board ("FASB") issued ASU 2018-02, Income Statement – Reporting Comprehensive Income (Topic 220) – Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income, to allow entities to reclassify the income tax effects of the Tax Act on items within accumulated other comprehensive income to retained earnings. The adoption of ASU 2018-02 in the fourth quarter of 2018 did not have a significant impact on our consolidated financial statements and associated disclosures as we did not elect to reclassify the income tax effects of the Tax Act from accumulated other comprehensive income to retained earnings.

In August 2017, the FASB issued ASU 2017-12, Derivatives and Hedging (Topic 815) – Targeted Improvements to Accounting for Hedging Activities, to simplify certain aspects of hedge accounting for both non-financial and financial risks and better align the recognition and measurement of hedge results with an entity's risk management activities. ASU 2017-12 also amends certain presentation and disclosure requirements for hedging activities and changes how an entity assesses hedge effectiveness. ASU 2017-12 is effective for fiscal years and interim periods within those years beginning after December 15, 2018, and early adoption is permitted. We are currently evaluating the impact ASU 2017-12 will have on our consolidated financial statements and associated disclosures.

In October 2016, the FASB issued ASU 2016-16, Income Taxes (Topic 230) – Intra-Entity Transfers of Assets Other Than Inventory. ASU 2016-16 requires the recognition of income tax consequences of intra-entity transfers of assets, other than inventory, when the transfer occurs. Two common examples of assets included in the scope of ASU 2016-16 are intellectual property and long-lived assets. The adoption of ASU 2016-16 in the first quarter of 2018 did not have a significant impact on our consolidated financial statements and associated disclosures.

In June 2016, the FASB issued ASU 2016-13, Financial Instruments – Credit Losses (Topic 326), to provide financial statement users with more useful information about expected credit losses. ASU 2016-13 also changes how entities measure credit losses on financial instruments and the timing of when such losses are recorded. ASU 2016-13 is effective for fiscal years and interim periods within those years beginning after December 15, 2019, and early adoption is permitted for periods beginning after December 15, 2018. We are currently evaluating the impact ASU 2016-13 will have on our consolidated financial statements and associated disclosures.

In February 2016, the FASB issued ASU 2016-02, Leases (Topic 842), to increase transparency and comparability among organizations by recognizing a right-of-use asset and a lease liability on the balance sheet for all leases with terms longer than 12 months and disclosing key information about leasing transactions. Leases will be classified as either operating or financing, with such classification affecting the pattern of expense recognition in the income statement. ASU 2016-02 is effective for fiscal years and interim periods within those years beginning after December 15, 2018, and early adoption is permitted. In July 2018, the FASB issued ASU 2018-11, Leases (Topic 842) – Targeted

Improvements, which provided an optional transition method to apply the new lease requirements through a cumulative-effect adjustment in the period of adoption.

We expect to adopt ASU 2016-02 in the first quarter of 2019 using this optional transition method. We also expect to elect certain practical expedients permitted under the transition guidance, which, among other things, allow us to not

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reassess prior conclusions related to contracts containing leases or lease classification. We are currently evaluating the impact ASU 2016-02 will have on our consolidated financial statements and associated disclosures and designing the related processes and internal controls. We expect the adoption to have a significant impact on our consolidated balance sheet through the recognition of right-of-use assets and lease liabilities primarily related to real estate arrangements, but do not expect the adoption to have a significant impact on our results of operations or cash flows.

4. Restructuring and Asset Impairments

Cadmium Telluride Module Manufacturing and Corporate Restructuring

In November 2016, our board of directors approved a set of initiatives intended to accelerate our transition to Series 6 module manufacturing and restructure our operations to reduce costs and better align the organization with our long-term strategic plans. Accordingly, we expect to upgrade and replace our legacy manufacturing fleet over the next several years with Series 6 manufacturing equipment, thereby enabling the production of solar modules with a larger form factor, better product attributes, and a lower cost structure.

As part of these initiatives, we incurred net charges of $41.8 million during the year ended December 31, 2017, which included (i) $27.6 million of charges, primarily related to net losses on the disposition of previously impaired Series 4 and Series 5 manufacturing equipment, (ii) $7.6 million of severance benefits to terminated employees, and (iii) $6.7 million of net miscellaneous charges, primarily related to contract terminations, the write-off of operating supplies, and other Series 4 manufacturing exit costs.

The commencement of this operational transition in November 2016 represented an expectation that certain of our module manufacturing assets would be sold or otherwise disposed of significantly before the end of their previously estimated useful lives. As a result, we compared the undiscounted future cash flows of our module manufacturing assets to the carrying value of the asset group and determined that the group was not recoverable. Accordingly, we measured the fair value of the asset group using a combination of income and cost valuation techniques and recorded impairment losses of $640.3 million for the year ended December 31, 2016. During the year ended December 31, 2016 we also incurred charges of $14.1 million for severance benefits to terminated employees as we substantially reduced our workforce at our domestic and international facilities, including reductions in administrative and other staff, and $8.1 million for the closure of ancillary foreign operations, the write-off of operating supplies, and other miscellaneous charges.

Substantially all amounts associated with these restructuring and asset impairment charges related to our modules segment and were classified as “Restructuring and asset impairments” on the consolidated statements of operations, and substantially all of the associated liabilities were paid or settled as of December 31, 2017.

Crystalline Silicon Module Manufacturing Restructuring

In June 2016, our executive management elected to reallocate our crystalline silicon module production capacity to support next generation CdTe module offerings. As a result, we ended production of our crystalline silicon modules to focus on our core CdTe module technology and utility-scale PV solar power systems. The majority of our crystalline silicon module manufacturing associates were expected to be redeployed in other manufacturing operations.

In connection with these restructuring activities, we incurred charges of $81.4 million during the year ended December 31, 2016, which included (i) $35.9 million of impairment charges related to certain crystalline silicon module manufacturing equipment considered abandoned for accounting purposes, (ii) $35.8 million of impairment charges for developed technology intangible assets associated with our crystalline silicon module technology, (iii) $8.4 million of miscellaneous charges related to certain contract manufacturing agreements and the write-off of operating supplies, and (iv) $1.3 million of charges for severance benefits to terminated employees. All amounts associated with these charges related to our modules segment and were classified as “Restructuring and asset impairments” on the consolidated statements of operations.

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Other Restructuring

During the year ended December 31, 2012, we recognized a liability for the expected repayment of certain customs tax benefits as part of a prior restructuring activity. In December 2017, we reversed this liability as a result of meeting certain investment certificate criteria associated with the commencement of operations at our previously announced manufacturing plant in Vietnam and recorded a $4.7 million benefit to “Restructuring and asset impairments.”

5. Business Acquisitions

Enki Technology

In October 2016, we acquired 100% of the shares of Enki Technology, Inc. (“Enki”), a developer of advanced coating materials for the PV solar industry, for cash payments of $10.3 million, net of cash acquired of $0.3 million, and a promise to pay additional consideration of up to $7.0 million contingent on the achievement of certain production and module performance milestones. In connection with applying the acquisition method of accounting, $17.3 million of the purchase price consideration was assigned to an IPR&D intangible asset to be amortized over its useful life upon successful completion of the underlying projects, $4.4 million was assigned to a deferred tax liability, and $4.4 million was assigned to goodwill. The acquired IPR&D includes patents, technical information and know-how, and other proprietary information associated with the development and production of anti-reflective coating material that we expect to use in the production of our solar modules. Such technology is expected to improve our module conversion efficiency and overall durability at a lower cost structure compared to our current production processes.

6. Goodwill and Intangible Assets

Goodwill

The changes in the carrying amount of goodwill, by reporting unit, for the years ended December 31, 2018 and 2017 were as follows (in thousands):

	Balance at December 31, 2017	Acquisitions (Impairments)	Balance at December 31, 2018
Modules	$407,827	$ —	$407,827
Accumulated impairment losses	(393,365)	—	(393,365)
Total	$14,462	$ —	$14,462

	Balance at December 31, 2016	Acquisitions (Impairments)	Balance at December 31, 2017
Modules	$407,827	$ —	$407,827
Accumulated impairment losses	(393,365)	—	(393,365)
Total	$14,462	$ —	$14,462

2018 and 2017 Goodwill Impairment Testing

We performed our annual impairment analysis in the fourth quarter of 2018 and 2017. ASC 350-20 provides that prior to performing a quantitative goodwill impairment test, companies are permitted to perform a qualitative assessment of whether it is more likely than not that a reporting unit’s fair value is less than its carrying value to determine whether it is necessary to perform a quantitative goodwill impairment test. Such qualitative assessment considers various factors, including macroeconomic conditions, industry and market considerations, cost factors, the overall financial performance of a reporting unit, and any other relevant events affecting our company or a reporting unit.

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We performed a qualitative assessment for our modules reporting unit in each respective period and concluded that it was not more likely than not that the fair value of the reporting unit was less than its carrying amount. Accordingly, a quantitative goodwill impairment test for this reporting unit was not required in either period.

2016 Goodwill Impairment Testing

As part of our annual impairment analysis in the fourth quarter of 2016, we elected to perform a quantitative goodwill impairment test instead of first performing a qualitative goodwill impairment test. Such quantitative impairment test represented the comparison of the fair value of our reporting units with their carrying amounts, including goodwill. As of the date of our testing, our reporting units were consistent with our reportable segments: modules and systems. In determining the fair value of our reporting units, we used a combination of income and market based valuation techniques.

Significant estimates used in our income based fair value calculations included: (i) future sales volumes and average selling prices per watt; (ii) cost per watt projections for module and system sales; (iii) future effective tax rates, which we estimated to be between 10% and 35%; (iii) forecasts of capital expenditures and working capital requirements; (iv) discount rates, which we estimated to range between 11.5% and 18%; and (v) future terminal values of our reporting units, which are based on their ability to exist into perpetuity. Significant estimates used in our market based fair value calculations included business enterprise values and revenue multiples of various publicly traded companies. The underlying assumptions used in the quantitative impairment test also considered our market capitalization as of the date of our testing and then-current solar industry market conditions.

As a result of our testing, we determined that the estimated fair value of our modules reporting unit exceeded its carrying value indicating no impairment was necessary for this reporting unit. However, we determined that the estimated fair value of our systems reporting unit was less than its carrying value, which required us to determine the implied fair value of goodwill for the systems reporting unit by allocating the fair value of the systems reporting unit to its individual assets and liabilities, including any unrecognized intangible assets. Based on such calculation, the implied fair value of goodwill for the systems reporting unit was zero, and we recorded an impairment loss of $68.8 million. Such impairment was primarily driven by a strategic shift in the mix of our module and system net sales, which was approved by our board of directors in November 2016. This shift involved an expected reduction in the annual megawatts sold through systems business projects from approximately two gigawatts per year over the prior several years to approximately one gigawatt per year going forward. Other factors that contributed to the impairment included our reduced market capitalization and the challenging conditions within the solar industry as of the date of our testing.

In June 2016, we impaired $6.1 million of goodwill associated with our crystalline silicon modules reporting unit as a result of the decision to end the related manufacturing operations and dispose of the reporting unit. See Note 4. “Restructuring and Asset Impairments” to our consolidated financial statements for further discussion related to this restructuring activity.

Intangible Assets, Net

The following tables summarize our intangible assets at December 31, 2018 and 2017 (in thousands):

	December 31, 2018		
	Gross Amount	Accumulated Amortization	Net Amount
Developed technology	$97,714	$ (33,093)	$64,621
Power purchase agreements	6,486	(648)	5,838
Patents	7,408	(3,705)	3,703

Total	$111,608	$ (37,446)	$74,162

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	December 31, 2017		
	Gross Amount	Accumulated Amortization	Net Amount
Developed technology	$76,959	$ (24,140)	$52,819
Power purchase agreements	6,486	(324)	6,162
Patents	7,068	(3,077)	3,991
In-process research and development (1)	17,255	—	17,255
Total	$107,768	$ (27,541)	$80,227

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(1) During the year ended December 31, 2018, $17.3 million of in-process research and development related to our prior Enki acquisition was reclassified to developed technology and began amortizing over its useful life of 10 years.

Amortization expense for our intangible assets was $9.9 million, $8.3 million, and $10.1 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Estimated future amortization expense for our definite-lived intangible assets was as follows at December 31, 2018 (in thousands):

	Amortization Expense
2019	$ 10,436
2020	10,786
2021	10,784
2022	10,759
2023	10,474
Thereafter	20,923
Total amortization expense	$ 74,162

7. Cash, Cash Equivalents, and Marketable Securities

Cash, cash equivalents, and marketable securities consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Cash and cash equivalents:		
Cash	$1,202,774	$2,142,949
Money market funds	200,788	125,585
Total cash and cash equivalents	1,403,562	2,268,534
Marketable securities:		
Foreign debt	318,646	238,858
Foreign government obligations	98,621	152,850
U.S. debt	44,468	73,671
Time deposits	681,969	255,000
Total marketable securities	1,143,704	720,379
Total cash, cash equivalents, and marketable securities	$2,547,266	$2,988,913

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The following table provides a reconciliation of cash, cash equivalents, and restricted cash reported within our consolidated balance sheets as of December 31, 2018 and 2017 to the total of such amounts as presented in the consolidated statements of cash flows (in thousands):

	Balance Sheet Line Item	2018	2017
Cash and cash equivalents	Cash and cash equivalents	$1,403,562	$2,268,534
Restricted cash – current (1)	Prepaid expenses and other current assets	19,671	11,120
Restricted cash – noncurrent (1)	Restricted cash and investments	139,390	50,822
Total cash, cash equivalents, and restricted cash		$1,562,623	$2,330,476

(1) See Note 8. “Restricted Cash and Investments” to our consolidated financial statements for discussion of our “Restricted cash” arrangements.

During the years ended December 31, 2018, 2017, and 2016, we sold marketable securities for proceeds of $10.8 million, $118.3 million, and $159.2 million, respectively, and realized gains of less than $0.1 million, less than $0.1 million, and $0.3 million, respectively, on such sales. See Note 11. “Fair Value Measurements” to our consolidated financial statements for information about the fair value of our marketable securities.

The following tables summarize the unrealized gains and losses related to our available-for-sale marketable securities, by major security type, as of December 31, 2018 and 2017 (in thousands):

	As of December 31, 2018			
	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Foreign debt	$320,056	$ 468	$ 1,878	$318,646
Foreign government obligations	99,189	—	568	98,621
U.S. debt	44,625	53	210	44,468
Time deposits	681,969	—	—	681,969
Total	$1,145,839	$ 521	$ 2,656	$1,143,704

	As of December 31, 2017			
	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Foreign debt	$240,643	$ 3	$ 1,788	$238,858
Foreign government obligations	153,999	—	1,149	152,850
U.S. debt	73,746	—	75	73,671
Time deposits	255,000	—	—	255,000
Total	$723,388	$ 3	$ 3,012	$720,379

As of December 31, 2018, we identified 15 investments totaling $207.2 million that had been in a loss position for a period of time greater than 12 months with unrealized losses of $1.8 million. As of December 31, 2017, we identified 16 investments totaling $210.3 million that had been in a loss position for a period of time greater than 12 months with unrealized losses of $1.9 million. The unrealized losses were primarily due to increases in interest rates relative to rates at the time of purchase. Based on the underlying credit quality of the investments, we do not intend to sell these securities prior to the recovery of our cost basis. Therefore, we did not consider these securities to be other-than-temporarily impaired.

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The following tables show unrealized losses and fair values for those marketable securities that were in an unrealized loss position as of December 31, 2018 and 2017, aggregated by major security type and the length of time the marketable securities have been in a continuous loss position (in thousands):

	As of December 31, 2018					
	In Loss Position for Less Than 12 Months		In Loss Position for 12 Months or Greater		Total	
	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses
Foreign debt	$150,842	$ 802	$94,446	$ 1,076	$245,288	$ 1,878
Foreign government obligations	—	—	98,621	568	98,621	568
U.S. debt	15,356	32	14,085	178	29,441	210
Total	$166,198	$ 834	$207,152	$ 1,822	$373,350	$ 2,656

	As of December 31, 2017					
	In Loss Position for Less Than 12 Months		In Loss Position for 12 Months or Greater		Total	
	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses
Foreign debt	$119,869	$ 735	$88,919	$ 1,053	$208,788	$ 1,788
Foreign government obligations	31,467	289	121,383	860	152,850	1,149
U.S. debt	$73,671	$ 75	$—	$ —	$73,671	$ 75
Total	$225,007	$ 1,099	$210,302	$ 1,913	$435,309	$ 3,012

The contractual maturities of our marketable securities as of December 31, 2018 were as follows (in thousands):

	Fair Value
One year or less	$904,384
One year to two years	161,961
Two years to three years	77,359
Total	$1,143,704

8. Restricted Cash and Investments

Restricted cash and investments consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Restricted cash	$139,390	$50,822
Restricted investments	179,000	373,961
Total restricted cash and investments (1)	$318,390	$424,783

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(1) There was an additional $19.7 million and $11.1 million of restricted cash included within “Prepaid expenses and other current assets” at December 31, 2018 and 2017, respectively.

At December 31, 2018 and 2017, our restricted cash consisted of deposits held by various banks to secure certain of our letters of credit and other deposits designated for the construction or operation of systems projects as well as the payment of amounts related to project specific debt financings. Restricted cash also included certain deposits held in custodial accounts to fund the estimated future costs of our solar module collection and recycling obligations. See Note 15. “Commitments and Contingencies” to our consolidated financial statements for further discussion relating to our letters of credit.

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At December 31, 2018 and 2017, our restricted investments consisted of long-term marketable securities that were also held in custodial accounts to fund the estimated future costs of collecting and recycling modules covered under our solar module collection and recycling program. As necessary, we fund any incremental amounts for our estimated collection and recycling obligations on an annual basis based on the estimated costs of collecting and recycling covered modules, estimated rates of return on our restricted investments, and an estimated solar module life of 25 years less amounts already funded in prior years. To ensure that amounts previously funded will be available in the future regardless of potential adverse changes in our financial condition (even in the case of our own insolvency), we have established a trust under which estimated funds are put into custodial accounts with an established and reputable bank, for which First Solar, Inc.; First Solar Malaysia Sdn. Bhd. ("FS Malaysia"); and First Solar Manufacturing GmbH are grantors. Trust funds may be disbursed for qualified module collection and recycling costs (including capital and facilities related recycling costs), payments to customers for assuming collection and recycling obligations, and reimbursements of any overfunded amounts. Investments in the trust must meet certain investment quality criteria comparable to highly rated government or agency bonds.

During the year ended December 31, 2018, we sold certain restricted investments for proceeds of $231.1 million and realized gains of $55.4 million on such sales as part of an effort to align the currencies of the investments with those of the corresponding collection and recycling liabilities and disburse $143.1 million of overfunded amounts. During the year ended December 31, 2016, we sold certain restricted investments for proceeds of $118.2 million and realized gains of $41.3 million on such sales as part of a separate effort to align the currencies of the investments with those of the corresponding collection and recycling liabilities.

See Note 11. "Fair Value Measurements" to our consolidated financial statements for information about the fair value of our restricted investments.

The following tables summarize the unrealized gains and losses related to our restricted investments, by major security type, as of December 31, 2018 and 2017 (in thousands):

	As of December 31, 2018			
	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Foreign government obligations	$73,798	$ 14,234	$ 235	$87,797
U.S. government obligations	97,223	416	6,436	91,203
Total	$171,021	$ 14,650	$ 6,671	$179,000

	As of December 31, 2017			
	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Foreign government obligations	$127,436	$ 62,483	$ —	$189,919
U.S. government obligations	174,624	12,944	3,526	184,042
Total	$302,060	$ 75,427	$ 3,526	$373,961

As of December 31, 2018, we identified six restricted investments totaling $87.4 million that had been in a loss position for a period of time greater than 12 months with unrealized losses of $6.4 million. As of December 31, 2017, we identified six restricted investments totaling $107.7 million that had been in a loss position for a period of time greater than 12 months with unrealized losses of $3.5 million. The unrealized losses were primarily due to increases in interest rates relative to rates at the time of purchase. Based on the underlying credit quality of the investments, we do not intend to sell these securities prior to the recovery of our cost basis. Therefore, we did not consider these investments to be other-than-temporarily impaired.

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The following tables show unrealized losses and fair values for those restricted investments that were in an unrealized loss position as of December 31, 2018 and 2017, aggregated by major security type and the length of time the restricted investments have been in a continuous loss position (in thousands):

	As of December 31, 2018					
	In Loss Position for Less Than 12 Months		In Loss Position for 12 Months or Greater		Total	
	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses
Foreign government obligations	$41,335	$ 235	$—	$ —	$41,335	$ 235
U.S. government obligations	—	—	87,401	6,436	87,401	6,436
Total	$41,335	$ 235	$87,401	$ 6,436	$128,736	$ 6,671

	As of December 31, 2017					
	In Loss Position for Less Than 12 Months		In Loss Position for 12 Months or Greater		Total	
	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses
U.S. government obligations	$—	$ —	$107,731	$ 3,526	$107,731	$ 3,526
Total	$—	$ —	$107,731	$ 3,526	$107,731	$ 3,526

As of December 31, 2018, the contractual maturities of our restricted investments were between 11 years and 18 years.

9. Consolidated Balance Sheet Details

Accounts receivable trade, net

Accounts receivable trade, net consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Accounts receivable trade, gross	$129,644	$213,776
Allowance for doubtful accounts	(1,362)	(1,979)
Accounts receivable trade, net	$128,282	$211,797

At December 31, 2018 and 2017, $8.5 million and $16.8 million, respectively, of our accounts receivable trade, net were secured by letters of credit, bank guarantees, or other forms of financial security issued by creditworthy financial institutions.

Accounts receivable, unbilled and retainage

Accounts receivable, unbilled and retainage consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Accounts receivable, unbilled	$441,666	$172,594
Retainage	16,500	2,014
Accounts receivable, unbilled and retainage	$458,166	$174,608

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Inventories

Inventories consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Raw materials	$224,329	$148,968
Work in process	41,294	14,085
Finished goods	252,372	122,594
Inventories	$517,995	$285,647
Inventories – current	$387,912	$172,370
Inventories – noncurrent	$130,083	$113,277

Prepaid expenses and other current assets

Prepaid expenses and other current assets consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Prepaid expenses	$90,981	$41,447
Prepaid income taxes	59,319	31,944
Indirect tax receivables	26,327	26,553
Restricted cash	19,671	11,120
Derivative instruments	2,364	4,303
Other current assets	44,399	42,535
Prepaid expenses and other current assets	$243,061	$157,902

Property, plant and equipment, net

Property, plant and equipment, net consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Land	$14,382	$8,181
Buildings and improvements	567,605	424,266
Machinery and equipment	1,826,434	1,059,103
Office equipment and furniture	178,011	157,512
Leasehold improvements	49,055	48,951
Construction in progress	405,581	641,263
Property, plant and equipment, gross	3,041,068	2,339,276
Accumulated depreciation	(1,284,857)	(1,184,739)
Property, plant and equipment, net	$1,756,211	$1,154,537

Depreciation of property, plant and equipment was $109.1 million, $91.4 million, and $211.2 million for the years ended December 31, 2018, 2017, and 2016, respectively.

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PV solar power systems, net

PV solar power systems, net consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
PV solar power systems, gross	$343,061	$451,045
Accumulated depreciation	(34,421)	(33,937)
PV solar power systems, net	$308,640	$417,108

Depreciation of PV solar power systems was $15.3 million, $19.8 million, and $11.7 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Capitalized interest

The cost of constructing project assets includes interest costs incurred during the construction period. The components of interest expense and capitalized interest were as follows during the years ended December 31, 2018, 2017, and 2016 (in thousands):

	2018	2017	2016
Interest cost incurred	$(31,752)	$(27,457)	$(26,157)
Interest cost capitalized – property, plant and equipment	—	—	1,878
Interest cost capitalized – project assets	5,831	1,692	3,741
Interest expense, net	$(25,921)	$(25,765)	$(20,538)

Project assets

Project assets consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Project assets – development costs, including project acquisition and land costs	$298,070	$250,590
Project assets – construction costs	200,359	252,127
Project assets	498,429	502,717
Project assets – current	$37,930	$77,931
Project assets – noncurrent	$460,499	$424,786

Other assets

Other assets consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Deferred rent	$27,249	$26,760
Indirect tax receivables	22,487	15,253
Notes receivable (1)	8,017	10,495
Income taxes receivable	4,444	4,454
Other	33,495	28,570
Other assets	$95,692	$85,532

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(1) In April 2009, we entered into a credit facility agreement with a solar power project entity of one of our customers for an available amount of €17.5 million to provide financing for a PV solar power system. The credit facility bears interest at 8.0% per annum, payable quarterly, with the full amount due in December 2026. As of December 31, 2018 and 2017, the balance outstanding on the credit facility was €7.0 million ($8.0 million and $8.4 million, respectively).

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Accrued expenses

Accrued expenses consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Accrued project costs	$147,162	$55,834
Accrued property, plant and equipment	89,905	133,433
Accrued inventory	53,075	24,830
Accrued compensation and benefits	41,937	73,985
Product warranty liability (1)	27,657	28,767
Other	81,844	49,978
Accrued expenses	$441,580	$366,827

(1) See Note 15. “Commitments and Contingencies” to our consolidated financial statements for discussion of our “Product warranty liability.”

Other current liabilities

Other current liabilities consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Derivative instruments	$7,294	$27,297
Contingent consideration (1)	665	6,162
Financing liability (2)	—	5,161
Indemnification liabilities (1)	—	2,876
Other	6,421	7,261
Other current liabilities	$14,380	$48,757

(1) See Note 15. “Commitments and Contingencies” to our consolidated financial statements for discussion of our “Contingent consideration” and “Indemnification liabilities” arrangements.

(2) See Note 12. “Equity Method Investments” to our consolidated financial statements for discussion of the financing liabilities associated with our leaseback of the Maryland Solar project.

Other liabilities

Other liabilities consisted of the following at December 31, 2018 and 2017 (in thousands):

	2018	2017
Product warranty liability (1)	$193,035	$195,507
Other taxes payable	83,058	89,724
Transition tax liability (2)	77,016	93,233
Deferred revenue	48,014	63,257
Derivative instruments	9,205	5,932
Contingent consideration (1)	2,250	3,153
Commercial letter of credit liability (1)	—	43,396
Financing liability (3)	—	29,822
Other	55,261	44,430
Other liabilities	$467,839	$568,454

(1) See Note 15. “Commitments and Contingencies” to our consolidated financial statements for discussion of our “Product warranty liability,” “Contingent consideration,” and “Commercial letter of credit liability” arrangements.

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(2) See Note 19. “Income Taxes” to our consolidated financial statements for discussion of the one-time transition tax on accumulated earnings of foreign subsidiaries as a result of the Tax Act.

(3) See Note 12. “Equity Method Investments” to our consolidated financial statements for discussion of the financing liabilities associated with our leaseback of the Maryland Solar project.

10. Derivative Financial Instruments

As a global company, we are exposed in the normal course of business to interest rate and foreign currency risks that could affect our financial position, results of operations, and cash flows. We use derivative instruments to hedge against these risks and only hold such instruments for hedging purposes, not for speculative or trading purposes.

Depending on the terms of the specific derivative instruments and market conditions, some of our derivative instruments may be assets and others liabilities at any particular balance sheet date. We report all of our derivative instruments at fair value and account for changes in the fair value of derivative instruments within “Accumulated other comprehensive (loss) income” if the derivative instruments qualify for hedge accounting. For those derivative instruments that do not qualify for hedge accounting (“economic hedges”), we record the changes in fair value directly to earnings. See Note 11. “Fair Value Measurements” to our consolidated financial statements for information about the techniques we use to measure the fair value of our derivative instruments.

The following tables present the fair values of derivative instruments included in our consolidated balance sheets as of December 31, 2018 and 2017 (in thousands):

	December 31, 2018		
	Prepaid Expenses and Other Current Assets	Other Current Liabilities	Other Liabilities
Derivatives designated as hedging instruments:			
Foreign exchange forward contracts	$158	$ —	$ —
Total derivatives designated as hedging instruments	$158	$ —	$ —
Derivatives not designated as hedging instruments:			
Foreign exchange forward contracts	$2,206	$ 7,096	$ —
Interest rate swap contracts	—	198	9,205
Total derivatives not designated as hedging instruments	$2,206	$ 7,294	$ 9,205
Total derivative instruments	$2,364	$ 7,294	$ 9,205

	December 31, 2017		
	Prepaid Expenses and Other Current Assets	Other Current Liabilities	Other Liabilities
Derivatives designated as hedging instruments:			
Foreign exchange forward contracts	$252	$ 13,240	$ —
Total derivatives designated as hedging instruments	$252	$ 13,240	$ —

Derivatives not designated as hedging instruments:			
Foreign exchange forward contracts	$4,051	$ 14,057	$ —
Interest rate swap contracts	—	—	5,932
Total derivatives not designated as hedging instruments	$4,051	$ 14,057	$ 5,932
Total derivative instruments	$4,303	$ 27,297	$ 5,932

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The following table presents the pretax amounts related to derivative instruments designated as cash flow hedges affecting accumulated other comprehensive income or loss and our consolidated statements of operations for the years ended December 31, 2018, 2017, and 2016 (in thousands):

	Foreign Exchange Forward Contracts	Interest Rate Swap Contract	Cross Currency Swap Contract	Total
Balance in accumulated other comprehensive (loss) income at December 31, 2015	$ 162	$ (16)	$ (2,017)	$ (1,871)
Amounts recognized in other comprehensive (loss) income	2,513	(2)	5,108	7,619
Amounts reclassified to earnings impacting:				
Foreign currency loss, net	—	—	(4,896)	(4,896)
Interest expense, net	(119)	18	1,805	1,704
Balance in accumulated other comprehensive (loss) income at December 31, 2016	2,556	—	—	2,556
Amounts recognized in other comprehensive (loss) income	(4,468)	—	—	(4,468)
Amounts reclassified to earnings impacting:				
Other income, net	189	—	—	189
Balance in accumulated other comprehensive (loss) income at December 31, 2017	(1,723)	—	—	(1,723)
Amounts recognized in other comprehensive (loss) income	(3,760)	—	—	(3,760)
Amounts reclassified to earnings impacting:				
Net sales	1,698	—	—	1,698
Cost of sales	212	—	—	212
Foreign currency loss, net	5,448	—	—	5,448
Other income, net	(546)	—	—	(546)
Balance in accumulated other comprehensive (loss) income at December 31, 2018	$ 1,329	$ —	$ —	$ 1,329

We recorded no amounts related to ineffective portions of our derivative instruments designated as cash flow hedges during the years ended December 31, 2018, 2017, and 2016. We recognized unrealized gains of $0.5 million and $0.7 million and unrealized losses of $0.9 million related to amounts excluded from effectiveness testing for our foreign exchange forward contracts designated as cash flow hedges within “Other income, net” during the years ended December 31, 2018, 2017, and 2016, respectively.

The following table presents gains and losses related to derivative instruments not designated as hedges affecting our consolidated statements of operations for the years ended December 31, 2018, 2017, and 2016 (in thousands):

		Amount of Gain (Loss) Recognized in Income		
	Income Statement Line Item	2018	2017	2016
Foreign exchange forward contracts	Foreign currency loss, net	$ 12,113	$ (33,882)	$ (14,002)
Interest rate swap contracts	Interest expense, net	(8,643)	(5,932)	—

Interest Rate Risk

We use interest rate swap contracts to mitigate our exposure to interest rate fluctuations associated with certain of our debt instruments. We do not use such swap contracts for speculative or trading purposes. During the years ended December 31, 2018 and 2017, all of our interest rate swap contracts related to project specific debt facilities. Such swap contracts did not qualify for accounting as cash flow hedges in accordance with ASC 815 due to our expectation to sell the associated projects before the maturity of their project specific debt financings and corresponding swap contracts. Accordingly, changes in the fair values of the swap contracts were recorded directly to “Interest expense, net.”

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In December 2018, Royal Solar GK, our indirect wholly-owned subsidiary and project company, entered into an interest rate swap contract to hedge a portion of the floating rate term loan facility under the project's Royal Solar Credit Facility (as defined in Note 14. "Debt" to our consolidated financial statements). Such swap had an initial notional value of ¥5.5 billion and entitled the project to receive a six-month floating Tokyo Interbank Offered Rate ("TIBOR") plus 0.65% interest rate while requiring the project to pay a fixed rate of 1.34%. The notional amount of the interest rate swap contract is scheduled to proportionately adjust with the scheduled draws and principal payments on the underlying hedged debt. In December 2018, we completed the sale of our Royal Solar project, and its interest rate swap contract and outstanding loan balance were assumed by the customer.

In August 2018, FS Japan Project 14 GK, our indirect wholly-owned subsidiary and project company, entered into an interest rate swap contract to hedge a portion of the floating rate senior loan facility under the project's Mashiko Credit Agreement (as defined in Note 14. "Debt" to our consolidated financial statements). Such swap had an initial notional value of ¥5.5 billion and entitled the project to receive a six-month floating TIBOR interest rate while requiring the project to pay a fixed rate of 0.820%. The notional amount of the interest rate swap contract is scheduled to proportionately adjust with the scheduled draws and principal payments on the underlying hedged debt. In December 2018, we completed the sale of our Mashiko project, and its interest rate swap contract and outstanding loan balance were assumed by the customer.

In May 2018, FS NSW Project No 1 Finco Pty Ltd, our indirectly wholly-owned subsidiary and project financing company, entered into various interest rate swap contracts to hedge the floating rate construction loan facility and a portion of the floating rate term loan facility under the associated project's Beryl Credit Facility (as defined in Note 14. "Debt" to our consolidated financial statements). The swaps had an initial aggregate notional value of AUD 42.4 million and, depending on the loan facility being hedged, entitled the project to receive one-month or three-month floating Bank Bill Swap Bid ("BBSY") interest rates while requiring the project to pay fixed rates of 2.0615% or 3.2020%. The notional amounts of the interest rate swap contracts are scheduled to proportionately adjust with the scheduled draws and principal payments on the underlying hedged debt. As of December 31, 2018, the aggregate notional value of the interest rate swap contracts was AUD 103.4 million ($72.9 million).

In March 2017, Manildra Finco Pty Ltd, our indirect wholly-owned subsidiary and project financing company, entered into various interest rate swap contracts to hedge a portion of the floating rate construction loan facility under the associated project's Manildra Credit Facility (as defined in Note 14. "Debt" to our consolidated financial statements). Such swaps had an initial aggregate notional value of AUD 12.8 million and entitled the project to receive a one-month or three-month floating BBSY interest rate while requiring the project to pay a fixed rate of 3.13%. The notional amounts of the interest rate swap contracts are scheduled to proportionately adjust with the scheduled draws and principal payments on the underlying hedged debt. In September 2018, we completed the sale of our Manildra project, and its interest rate swap contracts and outstanding loan balance were assumed by the customer. As of December 31, 2017, the aggregate notional value of the interest rate swap contracts was AUD 68.1 million ($48.0 million).

In January 2017, FS Japan Project 12 GK, our indirect wholly-owned subsidiary and project company, entered into an interest rate swap contract to hedge a portion of the floating rate senior loan facility under the project's Ishikawa Credit Agreement (as defined in Note 14. "Debt" to our consolidated financial statements). Such swap had an initial notional value of ¥5.7 billion and entitled the project to receive a six-month floating TIBOR plus 0.75% interest rate while requiring the project to pay a fixed rate of 1.482%. The notional amount of the interest rate swap contract is scheduled to proportionately adjust with the scheduled draws and principal payments on the underlying hedged debt. As of December 31, 2018 and 2017, the notional value of the interest rate swap contract was ¥19.2 billion ($174.1 million) and ¥12.8 billion ($115.7 million), respectively.

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Foreign Currency Risk

Cash Flow Exposure

We expect certain of our subsidiaries to have future cash flows that will be denominated in currencies other than the subsidiaries' functional currencies. Changes in the exchange rates between the functional currencies of our subsidiaries and the other currencies in which they transact will cause fluctuations in the cash flows we expect to receive or pay when these cash flows are realized or settled. Accordingly, we enter into foreign exchange forward contracts to hedge a portion of these forecasted cash flows. As of December 31, 2018 and 2017, these foreign exchange forward contracts hedged our forecasted cash flows for periods up to six months and nine months, respectively. These foreign exchange forward contracts qualify for accounting as cash flow hedges in accordance with ASC 815, and we designated them as such. We initially report the effective portion of a derivative's unrealized gain or loss in "Accumulated other comprehensive (loss) income" and subsequently reclassify amounts into earnings when the hedged transaction occurs and impacts earnings. We determined that these derivative financial instruments were highly effective as cash flow hedges as of December 31, 2018 and 2017.

As of December 31, 2018 and 2017, the notional values associated with our foreign exchange forward contracts qualifying as cash flow hedges were as follows (notional amounts and U.S. dollar equivalents in millions):

	December 31, 2018	
Currency	Notional Amount	USD Equivalent
Australian dollar	AUD 8.8	$6.2

	December 31, 2017	
Currency	Notional Amount	USD Equivalent
Indian rupee	INR 4,730.0	$74.1
Euro	€15.7	$18.8

In the following 12 months, we expect to reclassify to earnings $1.3 million of net unrealized gains related to these forward contracts that are included in "Accumulated other comprehensive (loss) income" at December 31, 2018 as we realize the earnings effects of the related forecasted transactions. The amount we ultimately record to earnings will depend on the actual exchange rates when we realize the related forecasted transactions.

Transaction Exposure and Economic Hedging

Many of our subsidiaries have assets and liabilities (primarily cash, receivables, marketable securities, deferred taxes, payables, accrued expenses, and solar module collection and recycling liabilities) that are denominated in currencies other than the subsidiaries' functional currencies. Changes in the exchange rates between the functional currencies of our subsidiaries and the other currencies in which these assets and liabilities are denominated will create fluctuations in our reported consolidated statements of operations and cash flows. We may enter into foreign exchange forward contracts or other financial instruments to economically hedge assets and liabilities against the effects of currency exchange rate fluctuations. The gains and losses on such foreign exchange forward contracts will economically offset all or part of the transaction gains and losses that we recognize in earnings on the related foreign currency denominated assets and liabilities.

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We also enter into foreign exchange forward contracts to economically hedge balance sheet and other exposures related to transactions between certain of our subsidiaries and transactions with third parties. Such contracts are considered economic hedges and do not qualify for hedge accounting. Accordingly, we recognize gains or losses from the fluctuations in foreign exchange rates and the fair value of these derivative contracts in “Foreign currency loss, net” on our consolidated statements of operations. These contracts mature at various dates within the next three months. As of December 31, 2018 and 2017, the notional values of our foreign exchange forward contracts that do not qualify for hedge accounting were as follows (notional amounts and U.S. dollar equivalents in millions):

	December 31, 2018		
Transaction	Currency	Notional Amount	USD Equivalent
Purchase	Australian dollar	AUD 2.1	$1.5
Sell	Australian dollar	AUD 52.9	$37.3
Purchase	Brazilian real	BRL 8.5	$2.2
Sell	Canadian dollar	CAD 2.9	$2.1
Sell	Chilean peso	CLP 3,506.6	$5.1
Purchase	Euro	€115.2	$131.9
Sell	Euro	€191.8	$219.7
Sell	Indian rupee	INR 789.2	$11.3
Purchase	Japanese yen	¥931.6	$8.4
Sell	Japanese yen	¥23,858.8	$216.2
Purchase	Malaysian ringgit	MYR 34.3	$8.3
Sell	Malaysian ringgit	MYR 53.8	$12.9
Sell	Mexican peso	MXN 37.3	$1.9
Purchase	Singapore dollar	SGD 3.8	$2.8

	December 31, 2017		
Transaction	Currency	Notional Amount	USD Equivalent
Purchase	Australian dollar	AUD 12.7	$9.9
Sell	Australian dollar	AUD 56.8	$44.4
Sell	Canadian dollar	CAD 1.7	$1.4
Sell	Chilean peso	CLP 10,180.9	$16.6
Purchase	Chinese yuan	CNY 13.8	$2.1
Purchase	Euro	€151.4	$181.6
Sell	Euro	€193.2	$231.7
Purchase	Indian rupee	INR 645.7	$10.1
Sell	Indian rupee	INR 8,376.0	$131.1
Sell	Japanese yen	¥23,922.2	$212.6
Purchase	Malaysian ringgit	MYR 31.0	$7.7
Sell	Malaysian ringgit	MYR 336.5	$83.1
Sell	Singapore dollar	SGD 3.1	$2.3
Purchase	South African rand	ZAR 12.5	$1.0
Sell	South African rand	ZAR 61.1	$5.0

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11. Fair Value Measurements

The following is a description of the valuation techniques that we use to measure the fair value of assets and liabilities that we measure and report at fair value on a recurring basis:

- Cash Equivalents. At December 31, 2018 and 2017, our cash equivalents consisted of money market funds. We value our cash equivalents using observable inputs that reflect quoted prices for securities with identical characteristics, and accordingly, we classify the valuation techniques that use these inputs as Level 1.

- Marketable Securities and Restricted Investments. At December 31, 2018 and 2017, our marketable securities consisted of foreign debt, foreign government obligations, U.S. debt, and time deposits, and our restricted investments consisted of foreign and U.S. government obligations. We value our marketable securities and restricted investments using observable inputs that reflect quoted prices for securities with identical characteristics or quoted prices for securities with similar characteristics and other observable inputs (such as interest rates that are observable at commonly quoted intervals). Accordingly, we classify the valuation techniques that use these inputs as either Level 1 or Level 2 depending on the inputs used. We also consider the effect of our counterparties' credit standing in these fair value measurements.

- Derivative Assets and Liabilities. At December 31, 2018 and 2017, our derivative assets and liabilities consisted of foreign exchange forward contracts involving major currencies and interest rate swap contracts involving major interest rates. Since our derivative assets and liabilities are not traded on an exchange, we value them using standard industry valuation models. As applicable, these models project future cash flows and discount the amounts to a present value using market-based observable inputs, including interest rate curves, credit risk, foreign exchange rates, and forward and spot prices for currencies. These inputs are observable in active markets over the contract term of the derivative instruments we hold, and accordingly, we classify the valuation techniques as Level 2. In evaluating credit risk, we consider the effect of our counterparties' and our own credit standing in the fair value measurements of our derivative assets and liabilities, respectively.

At December 31, 2018 and 2017, the fair value measurements of our assets and liabilities measured on a recurring basis were as follows (in thousands):

		Fair Value Measurements at Reporting Date Using		
	December 31, 2018	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents:				
Money market funds	$ 200,788	$ 200,788	$ —	$ —
Marketable securities:				
Foreign debt	318,646	—	318,646	—
Foreign government obligations	98,621	—	98,621	—
U.S. debt	44,468	—	44,468	—
Time deposits	681,969	681,969	—	—

Restricted investments	179,000	—	179,000	—
Derivative assets	2,364	—	2,364	—
Total assets	$ 1,525,856	$882,757	$ 643,099	$ —
Liabilities:				
Derivative liabilities	$ 16,499	$—	$ 16,499	$ —

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	December 31, 2017	Fair Value Measurements at Reporting Date Using Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents:				
Money market funds	$ 125,585	$125,585	$ —	$ —
Marketable securities:				
Foreign debt	238,858	—	238,858	—
Foreign government obligations	152,850	—	152,850	—
U.S. debt	73,671	—	73,671	—
Time deposits	255,000	255,000	—	—
Restricted investments	373,961	—	373,961	—
Derivative assets	4,303	—	4,303	—
Total assets	$ 1,224,228	$380,585	$ 843,643	$ —
Liabilities:				
Derivative liabilities	$ 33,229	$—	$ 33,229	$ —

Fair Value of Financial Instruments

At December 31, 2018 and 2017, the carrying values and fair values of our financial instruments not measured at fair value were as follows (in thousands):

	December 31, 2018		December 31, 2017	
	Carrying Value	Fair Value	Carrying Value	Fair Value
Assets:				
Notes receivable – noncurrent	$8,017	$8,010	$10,495	$10,516
Notes receivable, affiliate – current	—	—	20,411	23,317
Notes receivable, affiliates – noncurrent	22,832	24,295	48,370	47,441
Liabilities:				
Long-term debt, including current maturities (1)	$479,157	$470,124	$406,388	$416,486

(1) Excludes capital lease obligations and unamortized discounts and issuance costs.

The carrying values in our consolidated balance sheets of our trade accounts receivable, unbilled accounts receivable and retainage, restricted cash, accounts payable, and accrued expenses approximated their fair values due to their nature and relatively short maturities; therefore, we excluded them from the foregoing table. The fair value measurements for our notes receivable and long-term debt are considered Level 2 measurements under the fair value hierarchy.

Credit Risk

We have certain financial and derivative instruments that subject us to credit risk. These consist primarily of cash, cash equivalents, marketable securities, accounts receivable, restricted cash and investments, notes receivable, and foreign exchange forward contracts. We are exposed to credit losses in the event of nonperformance by the counterparties to our financial and derivative instruments. We place cash, cash equivalents, marketable securities, restricted cash and investments, and foreign exchange forward contracts with various high-quality financial institutions and limit the amount of credit risk from any one counterparty. We continuously evaluate the credit standing of our counterparty financial institutions. Our net sales are primarily concentrated among a limited number of customers. We monitor the

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financial condition of our customers and perform credit evaluations whenever considered necessary. Depending upon the sales arrangement, we may require some form of payment security from our customers, including advance payments, parent guarantees, bank guarantees, surety bonds, or commercial letters of credit. We also have PPAs that subject us to credit risk in the event our offtake counterparties are unable to fulfill their contractual obligations, which may adversely affect our project assets and certain receivables. Accordingly, we closely monitor the credit standing of existing and potential offtake counterparties to limit such risks.

12. Equity Method Investments

From time to time, we may enter into investments or other strategic arrangements to expedite our penetration of certain markets and establish relationships with potential customers. We may also enter into strategic arrangements with customers or other entities to maximize the value of particular projects. Some of these arrangements may involve significant investments or other allocations of capital. Investments in unconsolidated entities for which we have significant influence, but not control, over the entities' operating and financial activities are accounted for under the equity method of accounting. The following table summarizes our equity method investments as of December 31, 2018 and 2017 (in thousands):

	2018	2017
8point3 Operating Company, LLC	$—	$199,477
Clean Energy Collective, LLC	—	6,521
Other	3,186	11,232
Equity method investments	$3,186	$217,230

8point3 Operating Company, LLC

In June 2015, 8point3, a limited partnership formed with SunPower Corporation (together with First Solar, the "Sponsors"), completed its initial public offering (the "IPO") pursuant to a Registration Statement on Form S-1, as amended. As part of the IPO, the Sponsors contributed interests in various projects to OpCo in exchange for voting and economic interests in the entity, and 8point3 acquired an economic interest in OpCo using proceeds from the IPO. After the formation of 8point3, the Sponsors, from time to time, sold interests in solar projects to 8point3, which owns and operates such portfolio of solar energy generation projects.

In February 2018, we entered into an agreement with CD Clean Energy and Infrastructure V JV, LLC, an equity fund managed by Capital Dynamics and certain other co-investors and other parties, pursuant to which the purchasers agreed to acquire our interests in 8point3 and its subsidiaries. In June 2018, we completed the sale of those interests and received net proceeds of $240.0 million after the payment of fees, expenses, and other amounts.

We accounted for our interest in OpCo, a subsidiary of 8point3, under the equity method of accounting as we were able to exercise significant influence over 8point3 due to our representation on the board of directors of its general partner and certain of our associates serving as officers of its general partner. We recognized equity in earnings, net of tax, from our investment in OpCo of $39.7 million, $9.8 million, and $32.6 million for the years ended December 31, 2018, 2017, and 2016, respectively. Our equity in earnings for the year ended December 31, 2018 included a gain of $40.3 million, net of tax, for the sale of our interests in 8point3 and its subsidiaries. Our equity in earnings for the year ended December 31, 2016 included a gain of $8.5 million, net of tax, following OpCo's issuance of 8,050,000 shares to 8point3 as part of its public offering of a corresponding number of shares. During the years ended December 31, 2018, 2017, and 2016, we received distributions from OpCo of $12.4 million, $23.0 million, and $5.3 million, respectively.

In connection with the IPO, we also entered into an agreement with a subsidiary of 8point3 to lease back one of our originally contributed projects, Maryland Solar, until December 31, 2019. Under the terms of the agreement, we make fixed rent payments to 8point3's subsidiary and are entitled to all of the energy generated by the project. Due to certain continuing involvement with the project, we accounted for the leaseback agreement as a financing transaction until the sale of our interests in 8point3 and its subsidiaries in June 2018. Following the sale of such interests, the Maryland

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Solar project qualified for sale-leaseback accounting, and we recognized net revenue of $32.0 million from the sale of the project. As of December 31, 2017, the financing obligation associated with the leaseback was $35.0 million.

In March 2018, FirstEnergy Solutions Corp. (“FirstEnergy”), the off-taker for the Maryland Solar PPA, filed for chapter 11 bankruptcy protection, and in April 2018, FirstEnergy filed a motion for entry of an order authorizing FirstEnergy and its affiliates to reject certain energy contracts, including the Maryland Solar PPA. In August 2018, the bankruptcy court granted the motion. As a result, we began selling energy generated by the Maryland Solar project on an open contract basis in October 2018.

In December 2016, we completed the sale of our remaining 34% interest in the 300 MW_{AC} Desert Stateline project located in San Bernardino County, California to OpCo and received a $50.0 million promissory note as part of the consideration for the sale. In June 2018, the outstanding balance on the promissory note of $47.8 million was repaid in conjunction with the sale of our interests in 8point3 and its subsidiaries. As of December 31, 2017, the balance outstanding on the promissory note was $48.4 million.

We provide O&M services to certain of 8point3’s partially owned project entities, including SG2 Holdings, LLC; Lost Hills Blackwell Holdings, LLC; NS Solar Holdings, LLC; Kingbird Solar A, LLC; Kingbird Solar B, LLC; and Desert Stateline LLC. Prior to the sale of our interests in 8point3 and its subsidiaries, we recognized revenue of $5.6 million, $11.0 million, and $6.1 million for such O&M services during the years ended December 31, 2018, 2017, and 2016, respectively.

Clean Energy Collective, LLC

In November 2014, we entered into various agreements to purchase a minority ownership interest in Clean Energy Collective, LLC (“CEC”). This investment provided us with additional access to the distributed generation market and a partner to develop and market community solar offerings to North American residential customers and businesses directly on behalf of client utility companies. As part of the investment, we also received a warrant to purchase additional ownership interests in CEC.

In addition to our equity investment, we also entered into a term loan agreement and a convertible loan agreement with CEC in November 2014 and February 2016, respectively. Our term loan bears interest at 16% per annum, and our convertible loan bears interest at 10% per annum. In November 2018, we amended the terms of the loan agreements to (i) extend their maturity to June 2020, (ii) waive the conversion features on our convertible loan, and (iii) increase the frequency of interest payments, subject to certain conditions. As of December 31, 2018 and 2017, the aggregate balance outstanding on the loans was $22.8 million and $20.4 million, respectively.

In September 2018, the board of managers of CEC evaluated restructuring proposals to address certain liquidity issues that were adversely affecting its operations. Such restructuring provided for the subsequent repayment of CEC’s outstanding debt, including our loan agreements, but indicated that a decrease in the value of our investment in CEC may have occurred that was other than temporary. Accordingly, in September 2018, we recorded an impairment loss of $3.5 million, net of tax, for our remaining investment in CEC based on the proposed restructuring. In September 2018, we also recorded an impairment loss of $1.8 million in “Other (loss) income, net” for the expected surrender of our warrant. In November 2018, the owners and lenders of CEC entered into various restructuring agreements based on the previously proposed arrangement. In January 2019, the restructuring was finalized, which resulted in a dilution of our ownership interest in CEC, the loss of representation on the company’s board of managers, and the surrender of our warrant.

As of December 31, 2018, CEC was considered a variable interest entity, or VIE, and our 25% ownership interest in and loans to the company were considered variable interests. We accounted for our investment in CEC under the equity method of accounting as we were not the primary beneficiary of the company given that we did not have the power to make decisions over the activities that most significantly impact the company's economic performance. Under the equity method of accounting, we recognized equity in earnings for our proportionate share of CEC's net income or loss

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including adjustments for the amortization of a basis difference resulting from the cost of our investment differing from our proportionate share of CEC's equity. During the years ended December 31, 2018, 2017, and 2016, we recognized losses, net of tax, of $4.3 million, $2.6 million, and $3.6 million, respectively, from our investment in CEC, including the impairment of our remaining investment described above. During the year ended December 31, 2017, we sold 21 MW_{DC} of solar modules to CEC and recognized revenue of $7.6 million.

Summarized Financial Information

The following table presents summarized financial information, in the aggregate, for our significant equity method investees, as provided to us by the investees (in thousands):

	Fiscal 2018	Fiscal 2017	Fiscal 2016
Summary statement of operations information:			
Net sales	$28,736	$70,089	$125,643
Operating (loss) income	(38,606)	24,661	55,266
Net (loss) income (1)	(39,280)	46,713	63,893
Net (loss) income attributable to equity method investees (1) (2)	(45,228)	53,183	190,240

	As of Fiscal 2018	As of Fiscal 2017
Summary balance sheet information:		
Current assets	$—	$36,744
Long-term assets	—	1,573,115
Current liabilities	—	7,648
Long-term liabilities	—	706,885
Noncontrolling interests, including redeemable noncontrolling interests	—	72,945

(1) The difference between Net (loss) income and Net (loss) income attributable to equity method investees is due to OpCo's tax equity financing facilities with third-party investors that hold noncontrolling ownership interests in certain of its subsidiaries. Accordingly, earnings or losses are allocated to such tax equity investors using the Hypothetical Liquidation at Book Value (or "HLBV") method. During the fiscal 2018, 2017, and 2016 periods, OpCo allocated certain losses to such third-party investors under the HLBV method, which represented the difference between Net (loss) income and Net (loss) income attributable to equity method investees.

(2) Our proportionate share of OpCo's net loss for fiscal 2018 excluded the investee's impairment loss related to the Maryland Solar project as we accounted for the sale-leaseback of the project as a financing transaction and the associated financing liability exceeded the carrying value of the project.

13. Solar Module Collection and Recycling Liability

We previously established a module collection and recycling program to collect and recycle modules sold and covered under such program once the modules reach the end of their useful lives. For legacy customer sales contracts that were covered under this program, we agreed to pay the costs for the collection and recycling of qualifying solar modules, and the end-users agreed to notify us, disassemble their solar power systems, package the solar modules for shipment, and revert ownership rights over the modules back to us at the end of the modules' service lives. Accordingly, we recorded any collection and recycling obligations within "Cost of sales" at the time of sale based on the estimated cost to collect and recycle the covered solar modules. During the years ended December 31, 2018, 2017, and 2016, substantially all of our modules sold were not covered by our collection and recycling program as we discontinued including such program in our sales contracts.

We estimate the cost of our collection and recycling obligations based on the present value of the expected probability-weighted future cost of collecting and recycling the solar modules, which includes estimates for the cost of packaging materials; the cost of freight from the solar module installation sites to a recycling center; material, labor, and capital

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costs; the scale of recycling centers; and an estimated third-party profit margin and return on risk for collection and recycling services. We base these estimates on (i) our experience collecting and recycling our solar modules, (ii) the expected timing of when our solar modules will be returned for recycling, and (iii) the expected economic factors at the time the solar modules will be collected and recycled. In the periods between the time of sale and the related settlement of the collection and recycling obligation, we accrete the carrying amount of the associated liability by applying the discount rate used for its initial measurement. We classify accretion as an operating expense within "Selling, general and administrative" expense on our consolidated statements of operations.

We periodically review our estimates of expected future recycling costs and may adjust our liability accordingly. During the year ended December 31, 2018, we reduced our module collection and recycling liability by $34.2 million primarily due to higher by-product credits for glass, lower capital costs resulting from the expanded scale of our recycling facilities, and adjustments to certain valuation assumptions driven by our increased experience with module recycling. During the year ended December 31, 2017, we reduced our module collection and recycling liability by $15.8 million primarily as a result of updates to several valuation assumptions, including a decrease in certain inflation rates.

Our module collection and recycling liability was $134.4 million and $166.6 million as of December 31, 2018 and 2017, respectively. During the years ended December 31, 2018 and 2017, we recognized net benefits of $25.0 million and $13.2 million, respectively, to cost of sales as a result of the reductions in our module collection and recycling liability described above. During the year ended December 31, 2018, we also recognized a net benefit of $2.9 million to accretion expense primarily due to the reduction in the liability. During the years ended December 31, 2017 and 2016, we recognized net accretion expense of $3.9 million and $6.1 million, respectively, associated with the liability. As of December 31, 2018, a 1% increase in the annualized inflation rate used in our estimated future collection and recycling cost per module would increase our liability by $25.7 million, and a 1% decrease in that rate would decrease our liability by $21.7 million. See Note 8. "Restricted Cash and Investments" to our consolidated financial statements for more information about our arrangements for funding this liability.

14. Debt

Our long-term debt consisted of the following at December 31, 2018 and 2017 (in thousands):

		Balance (USD)	
Loan Agreement	Currency	2018	2017
Revolving Credit Facility	USD	$—	$—
Luz del Norte Credit Facilities	USD	188,849	185,675
Ishikawa Credit Agreement	JPY	157,834	121,446
Japan Credit Facility	JPY	—	10,710
Tochigi Credit Facility	JPY	25,468	—
Mashiko Credit Agreement	JPY	—	—
Royal Solar Credit Facility	JPY	—	—
Marikal Credit Facility	INR	—	7,384
Hindupur Credit Facility	INR	—	18,722
Anantapur Credit Facility	INR	16,101	—
Tungabhadra Credit Facility	INR	13,934	—
Manildra Credit Facility	AUD	—	62,451
Beryl Credit Facility	AUD	76,971	—
Capital lease obligations	Various	—	156
Long-term debt principal		479,157	406,544
Less: unamortized discounts and issuance costs		(12,366)	(13,004)
Total long-term debt		466,791	393,540

Less: current portion	(5,570)	(13,075)
Noncurrent portion	$461,221	$380,465

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Revolving Credit Facility

Our amended and restated credit agreement with several financial institutions as lenders and JPMorgan Chase Bank, N.A. as administrative agent provides us with a senior secured credit facility (the “Revolving Credit Facility”) with an aggregate borrowing capacity of $500.0 million, which we may increase to $750.0 million, subject to certain conditions. Borrowings under the credit facility bear interest at (i) London Interbank Offered Rate (“LIBOR”), adjusted for Eurocurrency reserve requirements, plus a margin of 2.00% or (ii) a base rate as defined in the credit agreement plus a margin of 1.00% depending on the type of borrowing requested. These margins are also subject to adjustment depending on our consolidated leverage ratio. We had no borrowings under our Revolving Credit Facility as of December 31, 2018 and 2017 and had issued $66.0 million and $57.5 million, respectively, of letters of credit using availability under the facility. Loans and letters of credit issued under the Revolving Credit Facility are jointly and severally guaranteed by First Solar, Inc.; First Solar Electric, LLC; First Solar Electric (California), Inc.; and First Solar Development, LLC and are secured by interests in substantially all of the guarantors’ tangible and intangible assets other than certain excluded assets.

In addition to paying interest on outstanding principal under the Revolving Credit Facility, we are required to pay a commitment fee at a rate of 0.30% per annum, based on the average daily unused commitments under the facility, which may also be adjusted due to changes in our consolidated leverage ratio. We also pay a letter of credit fee based on the applicable margin for Eurocurrency revolving loans on the face amount of each letter of credit and a fronting fee of 0.125%. Our Revolving Credit Facility matures in July 2022.

Luz del Norte Credit Facilities

In August 2014, Parque Solar Fotovoltaico Luz del Norte SpA (“Luz del Norte”), our indirect wholly-owned subsidiary and project company, entered into credit facilities with the Overseas Private Investment Corporation (“OPIC”) and the International Finance Corporation (“IFC”) to provide limited-recourse senior secured debt financing for the design, development, financing, construction, testing, commissioning, operation, and maintenance of a 141 MW_{AC} PV solar power plant located near Copiapó, Chile. At the same time, Luz del Norte also entered into a Chilean peso facility (the “VAT facility” and together with the OPIC and IFC loans, the “Luz del Norte Credit Facilities”) with Banco de Crédito e Inversiones to fund Chilean value added tax associated with the construction of the Luz del Norte project. In March 2017, we repaid the remaining balance on the VAT facility.

In March 2017, we amended the terms of the OPIC and IFC credit facilities. Such amendments (i) allowed for the capitalization of accrued and unpaid interest through March 15, 2017, along with the capitalization of certain future interest payments as variable rate loans under the credit facilities, (ii) allowed for the conversion of certain fixed rate loans to variable rate loans upon scheduled repayment, (iii) extended the maturity of the OPIC and IFC loans until June 2037, and (iv) canceled the remaining borrowing capacity under the OPIC and IFC credit facilities with the exception of the capitalization of certain future interest payments. As of December 31, 2018 and 2017, the balance outstanding on the OPIC loans was $141.4 million and $139.0 million, respectively. As of December 31, 2018 and 2017, the balance outstanding on the IFC loans was $47.4 million and $46.6 million, respectively. The OPIC and IFC loans are secured by liens over all of Luz del Norte’s assets and by a pledge of all of the equity interests in the entity. In February 2019, we received a waiver for a technical noncompliance related to the Luz Del Norte Credit Facilities as of December 31, 2018. We expect to cure such technical noncompliance within the waiver period, which expires in June 2019.

Ishikawa Credit Agreement

In December 2016, FS Japan Project 12 GK (“Ishikawa”), our indirect wholly-owned subsidiary and project company, entered into a credit agreement (the “Ishikawa Credit Agreement”) with Mizuho Bank, Ltd. for aggregate borrowings up to ¥27.3 billion ($247.4 million) for the development and construction of a 59 MW_{AC} PV solar power plant located in Ishikawa, Japan. The credit agreement consists of a ¥24.0 billion ($217.5 million) senior loan facility, a ¥2.1 billion ($19.0 million) consumption tax facility, and a ¥1.2 billion ($10.9 million) letter of credit facility. The senior loan facility matures in October 2036, and the consumption tax facility matures in April 2020. The credit agreement is secured by pledges of Ishikawa's assets, accounts, material project documents, and by the equity interests in the entity. As of December 31, 2018 and 2017, the balance outstanding on the credit agreement was $157.8 million and $121.4 million, respectively.

Japan Credit Facility

In September 2015, First Solar Japan GK, our wholly-owned subsidiary, entered into a construction loan facility with Mizuho Bank, Ltd. for borrowings up to ¥4.0 billion ($36.3 million) for the development and construction of utility-scale PV solar power plants in Japan (the "Japan Credit Facility"). In September 2018, First Solar Japan GK renewed the facility for an additional one-year period until September 2019. The facility is guaranteed by First Solar, Inc. and secured by pledges of certain projects' cash accounts and other rights in the projects. As of December 31, 2018 and 2017, the balance outstanding on the facility was zero and $10.7 million, respectively.

Tochigi Credit Facility

In June 2017, First Solar Japan GK, our wholly-owned subsidiary, entered into a term loan facility with Mizuho Bank, Ltd. for borrowings up to ¥7.0 billion ($63.4 million) for the development of utility-scale PV solar power plants in Japan (the "Tochigi Credit Facility"). The term loan facility matures in March 2021. The facility is guaranteed by First Solar, Inc. and secured by pledges of certain of First Solar Japan GK's accounts. As of December 31, 2018 and 2017, the balance outstanding on the term loan facility was $25.5 million and zero, respectively.

Mashiko Credit Agreement

In March 2018, FS Japan Project 14 GK ("Mashiko"), our indirect wholly-owned subsidiary and project company, entered into a credit agreement (the "Mashiko Credit Agreement") with Mizuho Bank, Ltd. for aggregate borrowings up to ¥9.2 billion ($83.4 million) for the development and construction of a 19 MW_{AC} PV solar power plant located in Tochigi, Japan. The credit agreement consisted of a ¥8.1 billion ($73.4 million) senior loan facility, a ¥0.7 billion ($6.3 million) consumption tax facility, and a ¥0.4 billion ($3.6 million) letter of credit facility. In December 2018, we completed the sale of our Mashiko project, and the outstanding balance of the Mashiko Credit Agreement of $57.2 million was assumed by the customer.

Royal Solar Credit Facility

In November 2018, Royal Solar GK, our indirect wholly-owned subsidiary and project company, entered into a credit agreement (the "Royal Solar Credit Facility") with Shinsei Bank, Ltd. for aggregate borrowings up to ¥11.8 billion ($106.9 million) for the development and construction of a 25 MW_{AC} PV solar power plant located in Gunma, Japan. The credit facility consisted of a ¥10.5 billion ($95.2 million) term loan facility, a ¥0.9 billion ($8.2 million) consumption tax facility, and a ¥0.4 billion ($3.6 million) debt service reserve facility. In December 2018, we completed the sale of our Royal Solar project, and the outstanding balance of the Royal Solar Credit Facility of $67.2 million was assumed by the customer.

Marikal Credit Facility

In March 2015, FS India Devco Private Limited (previously known as Marikal Solar Parks Private Limited), our indirect wholly-owned subsidiary and project company, entered into a term loan facility (the "Marikal Credit Facility") with Axis Bank as administrative agent for aggregate borrowings up to INR 0.5 billion ($7.8 million) for the development and construction of a 10 MW_{AC} PV solar power plant located in Telangana, India. In May 2018, we repaid the remaining $6.8 million principal balance on the term loan facility. As of December 31, 2017, the balance outstanding on the term loan facility was $7.4 million.

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Hindupur Credit Facility

In November 2016, Hindupur Solar Parks Private Limited, our indirect wholly-owned subsidiary and project company, entered into a term loan facility (the “Hindupur Credit Facility”) with Yes Bank Limited for borrowings up to INR 4.3 billion ($61.4 million) for costs related to an 80 MW_{AC} portfolio of PV solar power plants located in Andhra Pradesh, India. The term loan facility had a letter of credit sub-limit of INR 3.2 billion ($45.7 million), which was used for project related costs. In March 2018, we completed the sale of our Hindupur projects, and the outstanding balance of the Hindupur Credit Facility of $17.0 million was assumed by the customer. As of December 31, 2017, we had issued INR 2.9 billion ($41.4 million) of letters of credit under the term loan facility, and the balance outstanding on the term loan facility was $18.7 million.

Anantapur Credit Facility

In March 2018, Anantapur Solar Parks Private Limited, our indirect wholly-owned subsidiary and project company, entered into a term loan facility (the “Anantapur Credit Facility”) with J.P. Morgan Securities India Private Limited for borrowings up to INR 1.2 billion ($17.1 million) for costs related to a 20 MW_{AC} PV solar power plant located in Karnataka, India. The term loan facility matures in February 2021 and is secured by a letter of credit issued by JPMorgan Chase Bank, N.A., Singapore, in favor of the lender. Such letter of credit is secured by a cash deposit placed by First Solar FE Holdings Pte. Ltd. As of December 31, 2018, the balance outstanding on the term loan facility was $16.1 million.

Tungabhadra Credit Facility

In March 2018, Tungabhadra Solar Parks Private Limited, our indirect wholly-owned subsidiary and project company, entered into a term loan facility (the “Tungabhadra Credit Facility”) with J.P. Morgan Securities India Private Limited for borrowings up to INR 1.0 billion ($14.3 million) for costs related to a 20 MW_{AC} PV solar power plant located in Karnataka, India. The term loan facility matures in February 2021 and is secured by a letter of credit issued by JPMorgan Chase Bank, N.A., Singapore, in favor of the lender. Such letter of credit is secured by a cash deposit placed by First Solar FE Holdings Pte. Ltd. As of December 31, 2018, the balance outstanding on the term loan facility was $13.9 million.

Manildra Credit Facility

In March 2017, Manildra Finco Pty Ltd, our indirect wholly-owned subsidiary and project financing company, entered into a term loan facility (the “Manildra Credit Facility”) with Société Générale S.A. and The Bank of Tokyo-Mitsubishi UFJ, Ltd. for aggregate borrowings up to AUD 81.7 million ($57.6 million) for costs related to a 49 MW_{AC} PV solar power plant located in New South Wales, Australia. The credit facility consisted of an AUD 75.7 million ($53.4 million) construction loan facility and an additional AUD 6.0 million ($4.2 million) goods and service tax facility (“GST facility”) to fund certain taxes associated with the construction of the associated project. In September 2018, we completed the sale of our Manildra project, and the outstanding balance of the Manildra Credit Facility of $56.1 million was assumed by the customer. As of December 31, 2017, the balance outstanding on the credit facility was $62.5 million.

Beryl Credit Facility

In May 2018, FS NSW Project No 1 Finco Pty Ltd, our wholly-owned subsidiary and project financing company, entered into a term loan facility (the “Beryl Credit Facility”) with MUFG Bank, Ltd.; Société Générale, Hong Kong Branch; and Mizuho Bank, Ltd. for aggregate borrowings up to AUD 146.4 million ($103.2 million) for the development and construction of an 87 MW_{AC} PV solar power plant located in New South Wales, Australia. In

October 2018, the borrowing capacity on the Beryl Credit Facility was reduced to AUD 136.4 million ($96.2 million). Accordingly, the credit facility consists of an AUD 125.4 million ($88.4 million) construction loan facility, an AUD 7.0 million ($4.9 million) GST facility to fund certain taxes associated with the construction of the project, and an AUD 4.0 million ($2.8 million) letter of credit facility. Upon completion of the project's construction, the construction loan facility will convert

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to a term loan facility. The term loan facility matures in May 2023, and the GST facility matures in May 2020. The credit facility is secured by pledges of the borrower's assets, accounts, material project documents, and by the equity interests in the entity. As of December 31, 2018, the balance outstanding on the credit facility was $77.0 million.

Variable Interest Rate Risk

Certain of our long-term debt agreements bear interest at prime, LIBOR, TIBOR, BBSY, or equivalent variable rates. An increase in these variable rates would increase the cost of borrowing under our Revolving Credit Facility and certain project specific debt financings. Our long-term debt borrowing rates as of December 31, 2018 were as follows:

Loan Agreement	December 31, 2018
Revolving Credit Facility	4.50%
Luz del Norte Credit Facilities (1)	Fixed rate loans at bank rate plus 3.50% Variable rate loans at 91-Day U.S. Treasury Bill Yield or LIBOR plus 3.50%
Ishikawa Credit Agreement	Senior loan facility at 6-month TIBOR plus 0.75% (2) Consumption tax facility at 3-month TIBOR plus 0.5%
Japan Credit Facility	1-month TIBOR plus 0.5%
Tochigi Credit Facility	3-month TIBOR plus 1.0%
Anantapur Credit Facility	INR overnight indexed swap rate plus 1.5%
Tungabhadra Credit Facility	INR overnight indexed swap rate plus 1.5%
Beryl Credit Facility	Construction loan facility at 1-month BBSY plus 1.75% (2) GST facility at 1-month BBSY plus 1.00%

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(1) Outstanding balance comprised of $161.1 million of fixed rate loans and $27.7 million of variable rate loans as of December 31, 2018.

(2) We have entered into interest rate swap contracts to hedge portions of these variable rates. See Note 10. "Derivative Financial Instruments" to our consolidated financial statements for additional information.

During the years ended December 31, 2018, 2017, and 2016, we paid $16.6 million, $10.2 million, $4.3 million, respectively, of interest related to our long-term debt arrangements.

Future Principal Payments

At December 31, 2018, the future principal payments on our long-term debt were due as follows (in thousands):

	Total Debt
2019	$5,673
2020	26,935
2021	66,014
2022	12,221
2023	71,620
Thereafter	296,694
Total long-term debt future principal payments	$479,157

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15. Commitments and Contingencies

Commercial Commitments

During the normal course of business, we enter into commercial commitments in the form of letters of credit, bank guarantees, and surety bonds to provide financial and performance assurance to third parties. Our amended and restated Revolving Credit Facility provides us with a sub-limit of $400.0 million to issue letters of credit, subject to certain additional limits depending on the currencies of the letters of credit, at a fee based on the applicable margin for Eurocurrency revolving loans and a fronting fee. As of December 31, 2018, we had $66.0 million in letters of credit issued under our Revolving Credit Facility, leaving $334.0 million of availability for the issuance of additional letters of credit. As of December 31, 2018, we also had $0.6 million of bank guarantees and letters of credit under separate agreements that were posted by certain of our foreign subsidiaries and $281.1 million of letters of credit issued under three bilateral facilities, of which $44.4 million was secured with cash, leaving $157.9 million of aggregate available capacity under such agreements and facilities. We also had $57.8 million of surety bonds outstanding, leaving $658.5 million of available bonding capacity under our surety lines as of December 31, 2018. The majority of these letters of credit, bank guarantees, and surety bonds supported our systems projects.

In addition to the commercial commitments noted above, we also issued certain commercial letters of credit, also known as letters of undertaking, under our Hindupur Credit Facility as discussed in Note 14. “Debt” to our consolidated financial statements. Such commercial letters of credit represented conditional commitments on the part of the issuing financial institution to provide payment on amounts drawn in accordance with the terms of the individual documents. As part of the financing of the associated systems projects, we presented these commercial letters of credit to other financial institutions, whereby we received immediate funding, and these other financial institutions agreed to settle such letters at a future date. At the time of settlement, the balance of the commercial letters of credit would be included in the balance outstanding of the credit facility. In the periods between the receipt of cash and the subsequent settlement of the commercial letters of credit, we accrued interest on the balance or otherwise accreted any discounted value of the letters to their face value and recorded such amounts as “Interest expense, net” on our consolidated statements of operations. In March 2018, we completed the sale of our Hindupur projects, and the outstanding letters of credit of $43.3 million under the Hindupur Credit Facility were assumed by the customer. As of December 31, 2017, we accrued $43.4 million for contingent obligations associated with such commercial letters of credit. These amounts were classified as “Other liabilities” on our consolidated balance sheets to align with the timing in which we expected to settle such obligations as payments under the associated credit facility.

Lease Commitments

We lease our corporate headquarters, administrative offices, R&D facilities, and warehouse space in the United States and international locations under noncancelable operating leases. We also lease land for the development and construction of certain systems projects and, in international locations, for our manufacturing facilities. These leases may require us to pay property taxes, common area maintenance, and certain other costs in addition to base rent. We also lease certain machinery and equipment. Future minimum payments under our operating leases were as follows as of December 31, 2018 (in thousands):

	Total Minimum Lease Payments
2019	$ 13,839
2020	9,031
2021	8,309
2022	7,824

2023	7,749
Thereafter	100,062
Total operating lease obligations	$ 146,814

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Our rent expense was $18.9 million, $22.1 million, and $24.5 million for the years ended December 31, 2018, 2017, and 2016, respectively.

Purchase Commitments

We purchase raw materials, manufacturing equipment, construction materials, and various services from a variety of vendors. During the normal course of business, in order to manage manufacturing and construction lead times and help ensure an adequate supply of certain items, we enter into agreements with suppliers that either allow us to procure goods and services when we choose or that establish purchase requirements over the term of the agreement. In certain instances, our purchase agreements allow us to cancel, reschedule, or adjust our purchase requirements based on our business needs prior to firm orders being placed. Consequently, only a portion of our purchase commitments are firm and noncancelable or cancelable with a significant penalty. At December 31, 2018, our obligations under such arrangements were $1.4 billion, of which $335.6 million related to capital expenditures. We expect to make $875.7 million of payments under these purchase obligations in 2019.

Product Warranties

When we recognize revenue for module or system sales, we accrue liabilities for the estimated future costs of meeting our limited warranty obligations for both modules and the balance of the systems. We make and revise these estimates based primarily on the number of solar modules under warranty installed at customer locations, our historical experience with warranty claims, our monitoring of field installation sites, our internal testing and the expected future performance of our solar modules and BoS parts, and our estimated replacement costs. From time to time, we have taken remediation actions with respect to affected modules beyond our limited warranties and may elect to do so in the future, in which case we would incur additional expenses. Such potential voluntary future remediation actions beyond our limited warranty obligations may be material to our consolidated statements of operations if we commit to any such remediation actions.

Product warranty activities during the years ended December 31, 2018, 2017, and 2016 were as follows (in thousands):

	2018	2017	2016
Product warranty liability, beginning of period	$224,274	$252,408	$231,751
Accruals for new warranties issued	14,132	23,313	35,256
Settlements	(11,851)	(11,329)	(16,266)
Changes in estimate of product warranty liability	(5,863)	(40,118)	1,667
Product warranty liability, end of period	$220,692	$224,274	$252,408
Current portion of warranty liability	$27,657	$28,767	$40,079
Noncurrent portion of warranty liability	$193,035	$195,507	$212,329

During the year ended December 31, 2017, we reduced our product warranty liability by $31.3 million as a result of a reduction in the estimated replacement cost of our modules under warranty. Such change in estimate was primarily driven by continued reductions in the manufacturing cost per watt of our solar modules.

We estimate our limited product warranty liability for power output and defects in materials and workmanship under normal use and service conditions based on warranty return rates of approximately 1% to 3% for modules covered under warranty, depending on the series of module technology. As of December 31, 2018, a 1% change in estimated warranty return rates would change our module warranty liability by $74.6 million, and a 1% change in the estimated warranty return rate for BoS parts would not have a material impact on the associated warranty liability.

Performance Guarantees

As part of our systems business, we conduct performance testing of a system prior to substantial completion to confirm the system meets its operational and capacity expectations noted in the EPC agreement. In addition, we may provide

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an energy performance test during the first or second year of a system's operation to demonstrate that the actual energy generation for the applicable period meets or exceeds the modeled energy expectation, after certain adjustments. If there is an underperformance event with regards to these tests, we may incur liquidated damages as specified in the EPC contract. In certain instances, a bonus payment may be received at the end of the applicable test period if the system performs above a specified level. As of December 31, 2018 and 2017, we accrued $0.4 million and $2.1 million, respectively, of estimated obligations under such arrangements, which were classified as "Other current liabilities" in our consolidated balance sheets.

As part of our O&M service offerings, we typically offer an effective availability guarantee, which stipulates that a system will be available to generate a certain percentage of total possible energy during a specific period after adjusting for factors outside of our control as the service provider, such as weather, curtailment, outages, force majeure, and other conditions that may affect system availability. Effective availability guarantees are only offered as part of our O&M services and terminate at the end of an O&M arrangement. If we fail to meet the contractual threshold for these guarantees, we may incur liquidated damages for certain lost energy under the PPA. Our O&M agreements typically contain provisions limiting our total potential losses under an agreement, including amounts paid for liquidated damages, to a percentage of O&M fees. Many of our O&M agreements also contain provisions whereby we may receive a bonus payment if system availability exceeds a separate threshold. As of December 31, 2018 and 2017, we did not accrue any estimated obligations under our effective availability guarantees.

Indemnifications

In certain limited circumstances, we have provided indemnifications to customers, including project tax equity investors, under which we are contractually obligated to compensate such parties for losses they suffer resulting from a breach of a representation, warranty, or covenant or a reduction in tax benefits received, including investment tax credits. Project related tax benefits are, in part, based on guidance provided by the IRS and U.S. Treasury Department, which includes assumptions regarding the fair value of qualifying PV solar power systems. For any sales contracts that have such indemnification provisions, we initially recognize a liability under ASC 460 for the estimated premium that would be required by a guarantor to issue the same indemnity in a standalone arm's-length transaction with an unrelated party.

We typically base these estimates on the cost of insurance policies that cover the underlying risks being indemnified and may purchase such policies to mitigate our exposure to potential indemnification payments. We subsequently measure such liabilities at the greater of the initially estimated premium or the contingent liability required to be recognized under ASC 450. We recognize any indemnification liabilities as a reduction of revenue in the related transaction.

After an indemnification liability is recorded, we derecognize such amount pursuant to ASC 460-10-35-2 depending on the nature of the indemnity, which derecognition typically occurs upon expiration or settlement of the arrangement, and any contingent aspects of the indemnity are accounted for in accordance with ASC 450. As of December 31, 2018 and 2017, we accrued $3.0 million and $4.9 million of noncurrent indemnification liabilities, respectively, for tax related indemnifications. As of December 31, 2017, we also accrued $2.9 million of current indemnification liabilities for such matters. As of December 31, 2018, the maximum potential amount of future payments under our tax related and other indemnifications was $125.3 million, and we held insurance policies allowing us to recover up to $84.9 million of potential amounts paid under the indemnifications covered by the policies.

Contingent Consideration

As part of our prior acquisition of Enki, we agreed to pay additional consideration to the selling shareholders contingent upon the achievement of certain production and module performance milestones. See Note 5. "Business

Acquisitions” to our consolidated financial statements for further discussion of this acquisition. In October 2018, we paid the remaining consideration of $3.5 million to the selling shareholders as a result of the achievement of the second performance milestone. As of December 31, 2017, we accrued $1.8 million of current liabilities for our contingent obligations associated with the Enki acquisition based on their estimated fair values and the expected timing of payment.

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We continually seek to make additions to our advanced-stage project pipeline by actively developing our early-to-mid-stage project pipeline and by pursuing opportunities to acquire projects at various stages of development. In connection with such project acquisitions, we may agree to pay additional amounts to project sellers upon the achievement of certain milestones, such as obtaining a PPA, obtaining financing, or selling the project to a new owner. We recognize a project acquisition contingent liability when we determine that such a liability is both probable and reasonably estimable, and the carrying amount of the related project asset is correspondingly increased. As of December 31, 2018 and 2017, we accrued $0.7 million and $4.4 million of current liabilities, respectively, and $2.3 million and $3.2 million of long-term liabilities, respectively, for project related contingent obligations. Any future differences between the acquisition-date contingent obligation estimate and the ultimate settlement of the obligation are recognized as an adjustment to the project asset, as contingent payments are considered direct and incremental to the underlying value of the related project.

Legal Proceedings

Class Action

On March 15, 2012, a purported class action lawsuit titled Smilovits v. First Solar, Inc., et al., Case No. 2:12-cv-00555-DGC, was filed in the United States District Court for the District of Arizona (hereafter "Arizona District Court") against the Company and certain of our current and former directors and officers. The complaint was filed on behalf of persons who purchased or otherwise acquired the Company's publicly traded securities between April 30, 2008 and February 28, 2012 (the "Class Action"). The complaint generally alleges that the defendants violated Sections 10(b) and 20(a) of the Securities Exchange Act of 1934 by making false and misleading statements regarding the Company's financial performance and prospects. The action includes claims for damages, including interest, and an award of reasonable costs and attorneys' fees to the putative class. The Company believes it has meritorious defenses and will vigorously defend this action.

On July 23, 2012, the Arizona District Court issued an order appointing as lead plaintiffs in the Class Action the Mineworkers' Pension Scheme and British Coal Staff Superannuation Scheme (collectively, the "Pension Schemes"). The Pension Schemes filed an amended complaint on August 17, 2012, which contains similar allegations and seeks similar relief as the original complaint. Defendants filed a motion to dismiss on September 14, 2012. On December 17, 2012, the court denied defendants' motion to dismiss. On October 8, 2013, the Arizona District Court granted the Pension Schemes' motion for class certification and certified a class comprised of all persons who purchased or otherwise acquired publicly traded securities of the Company between April 30, 2008 and February 28, 2012 and were damaged thereby, excluding defendants and certain related parties. Merits discovery closed on February 27, 2015.

Defendants filed a motion for summary judgment on March 27, 2015. On August 11, 2015, the Arizona District Court granted defendants' motion in part and denied it in part, and certified an issue for immediate appeal to the Ninth Circuit Court of Appeals (the "Ninth Circuit"). First Solar filed a petition for interlocutory appeal with the Ninth Circuit, and that petition was granted on November 18, 2015. On May 20, 2016, the Pension Schemes moved to vacate the order granting the petition, dismiss the appeal, and stay the merits briefing schedule. On December 13, 2016, the Ninth Circuit denied the Pension Schemes' motion. On January 31, 2018, the Ninth Circuit issued an opinion affirming the Arizona District Court's order denying in part defendants' motion for summary judgment. On March 16, 2018, First Solar filed a petition for panel rehearing or rehearing en banc with the Ninth Circuit. On May 7, 2018, the Ninth Circuit denied defendants' petition. On August 6, 2018, defendants filed a petition for writ of certiorari to the U.S. Supreme Court. The Court has not yet ruled on that petition. Meanwhile, in the Arizona District Court, expert discovery was completed on February 5, 2019. The Arizona District Court vacated the previously scheduled trial date and all other deadlines until the outcome of the certiorari petition is clear.

This lawsuit asserts claims that, if resolved against us, could give rise to substantial damages, and an unfavorable outcome or settlement may result in a significant monetary judgment or award against us or a significant monetary payment by us, and could have a material adverse effect on our business, financial condition, and results of operations. Even if this lawsuit is not resolved against us, the costs of defending the lawsuit and of any settlement may

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be significant. These costs would likely exceed the dollar limits of our insurance policies or may not be covered by our insurance policies. Given the uncertainties of trial, at this time we are not in a position to assess the likelihood of any potential loss or adverse effect on our financial condition or to estimate the range of potential loss, if any.

Opt-Out Action

On June 23, 2015, a suit titled Maverick Fund, L.D.C. v. First Solar, Inc., et al., Case No. 2:15-cv-01156-ROS, was filed in Arizona District Court by putative stockholders that opted out of the Class Action. The complaint names the Company and certain of our current and former directors and officers as defendants, and alleges that the defendants violated Sections 10(b) and 20(a) of the Securities Exchange Act of 1934, and violated state law, by making false and misleading statements regarding the Company's financial performance and prospects. The action includes claims for recessionary and actual damages, interest, punitive damages, and an award of reasonable attorneys' fees, expert fees, and costs. The Company believes it has meritorious defenses and will vigorously defend this action.

First Solar and the individual defendants filed a motion to dismiss the complaint on July 16, 2018. On November 27, 2018, the Court granted defendants' motion to dismiss the plaintiffs' negligent misrepresentation claim under state law, but otherwise denied defendants' motion. This action is still in the initial stages, and there has been no discovery. Accordingly, at this time we are not in a position to assess the likelihood of any potential loss or adverse effect on our financial condition or to estimate the range of potential loss, if any.

Derivative Actions

On July 16, 2013, a derivative complaint was filed in the Superior Court of Arizona, Maricopa County, titled Bargar, et al. v. Ahearn, et al., Case No. CV2013-009938, by a putative stockholder against certain current and former directors and officers of the Company ("Bargar"). The complaint generally alleges that the defendants caused or allowed false and misleading statements to be made concerning the Company's financial performance and prospects. The action includes claims for, among other things, breach of fiduciary duties, insider trading, unjust enrichment, and waste of corporate assets. By court order on October 3, 2013, the Superior Court of Arizona, Maricopa County granted the parties' stipulation to defer defendants' response to the complaint pending resolution of the Class Action or expiration of a stay issued in certain consolidated derivative actions in the Arizona District Court. On November 5, 2013, the matter was placed on the court's inactive calendar. The parties have jointly sought and obtained multiple requests to continue the stay in this action. Most recently, on November 9, 2018, the court entered an order continuing the stay until March 29, 2019.

The Company believes that the plaintiff in the Bargar derivative action lacks standing to pursue litigation on behalf of First Solar. The Bargar derivative action is still in the initial stages and there has been no discovery. Accordingly, at this time we are not in a position to assess the likelihood of any potential loss or adverse effect on our financial condition or to estimate the range of potential loss, if any.

Other Matters and Claims

We are party to other legal matters and claims in the normal course of our operations. While we believe the ultimate outcome of such other matters and claims will not have a material adverse effect on our financial position, results of operations, or cash flows, the outcome of such matters and claims is not determinable with certainty, and negative outcomes may adversely affect us.

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16. Revenue from Contracts with Customers

The following table represents a disaggregation of revenue from contracts with customers for the years ended December 31, 2018, 2017, and 2016 along with the reportable segment for each category (in thousands):

Category	Segment	2018	2017	2016
Solar modules	Modules	$502,001	$806,398	$675,453
Solar power systems	Systems	1,244,175	1,927,122	1,131,961
EPC services	Systems	347,560	45,525	892,814
O&M services	Systems	103,186	101,024	93,476
Module plus	Systems	—	3,236	84,926
Energy generation (1)	Systems	47,122	58,019	25,933
Net sales		$2,244,044	$2,941,324	$2,904,563

(1) During the years ended December 31, 2017 and 2016, the majority of energy generated and sold by our PV solar power systems was accounted for under ASC 840 consistent with the classification of the associated PPAs.

We recognize revenue for module sales at a point in time following the transfer of control of the modules to the customer, which typically occurs upon shipment or delivery depending on the terms of the underlying contracts. Such contracts may contain provisions that require us to make liquidated damage payments to the customer if we fail to deliver modules by scheduled dates. We recognize these liquidated damages as a reduction of revenue in the period we transfer control of the modules to the customer.

We generally recognize revenue for sales of solar power systems and/or EPC services over time using cost based input methods, in which significant judgment is required to evaluate assumptions including the amount of net contract revenues and the total estimated costs to determine our progress towards contract completion and to calculate the corresponding amount of revenue to recognize. If the estimated total costs on any contract are greater than the net contract revenues, we recognize the entire estimated loss in the period the loss becomes known. The cumulative effect of revisions to estimates related to net contract revenues or costs to complete contracts are recorded in the period in which the revisions to estimates are identified and the amounts can be reasonably estimated.

Changes in estimates for sales of systems and EPC services occur for a variety of reasons, including but not limited to (i) construction plan accelerations or delays, (ii) module cost forecast changes, (iii) cost related change orders, or (iv) changes in other information used to estimate costs. Changes in estimates may have a material effect on our consolidated statements of operations. The following table outlines the impact on revenue of net changes in estimated transaction prices and input costs for systems related sales contracts (both increases and decreases) for the years ended December 31, 2018, 2017, and 2016 as well as the number of projects that comprise such changes. For purposes of the table, we only include projects with changes in estimates that have a net impact on revenue of at least $1.0 million during the periods presented with the exception of the sales and use tax matter described below, for which the aggregate change in estimate has been presented. Also included in the table is the net change in estimate as a percentage of the aggregate revenue for such projects.

	2018	2017	2016
Number of projects (1)	24	5	12
Increase (decrease) in revenue from net changes in transaction prices (in thousands) (1)	$63,361	$3,579	$(67,292)
Increase in revenue from net changes in input cost estimates (in thousands)	1,548	5,047	164,920
Net increase in revenue from net changes in estimates (in thousands)	$64,909	$8,626	$97,628
Net change in estimate as a percentage of aggregate revenue	0.6 %	0.6 %	1.6 %

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(1) During the year ended December 31, 2018, we settled a tax examination with the state of California regarding several matters, including certain sales and use tax payments due under lump sum EPC contracts. Accordingly, we revised our estimates of sales and use taxes due for projects in the state of California, which affected the estimated transaction prices for such contracts, and recorded an increase to revenue of $54.6 million.

The following table reflects the changes in our contract assets, which we classify as “Accounts receivable, unbilled” or “Retainage,” and our contract liabilities, which we classify as “Deferred revenue,” for the year ended December 31, 2018 (in thousands):

	2018	2017	Change	
Accounts receivable, unbilled	$441,666	$172,594		
Retainage	16,500	2,014		
Accounts receivable, unbilled and retainage	$458,166	$174,608	$283,558	162%
Deferred revenue (1)	$177,769	$145,073	$32,696	23 %

(1) Includes $48.0 million and $63.3 million of long-term deferred revenue classified as “Other liabilities” on our consolidated balance sheets as of December 31, 2018 and 2017, respectively.

Accounts receivable, unbilled represents a contract asset for revenue that has been recognized in advance of billing the customer, which is common for long-term construction contracts. Billing requirements vary by contract but are generally structured around the completion of certain construction milestones. Some of our EPC contracts for systems we build may also contain retainage provisions. Retainage represents a contract asset for the portion of the contract price earned by us for work performed, but held for payment by the customer as a form of security until we reach certain construction milestones. When we receive consideration, or such consideration is unconditionally due, from a customer prior to transferring goods or services to the customer under the terms of a sales contract, we record deferred revenue, which represents a contract liability. Such deferred revenue typically results from billings in excess of costs incurred on long-term construction contracts and advance payments received on sales of solar modules.

For the year ended December 31, 2018, our contract assets increased by $283.6 million primarily due to certain unbilled receivables associated with ongoing construction activities at the Willow Springs and California Flats projects and the completion of the sale of the Manildra project. For the year ended December 31, 2018, our contract liabilities increased by $32.7 million primarily as a result of advance payments received for sales of solar modules, partially offset by revenue recognition for certain EPC projects in Florida, for which we received a portion of the proceeds in 2017, and the completion of the sale of certain Japan projects, for which we collected the proceeds in 2017. During the years ended December 31, 2018 and 2017, we recognized revenue of $128.7 million and $308.6 million, respectively, that was included in the corresponding contract liability balance at the beginning of the periods.

The following table represents our remaining performance obligations as of December 31, 2018 for sales of solar power systems, including uncompleted sold projects, projects under sales contracts subject to conditions precedent, and EPC agreements for partner developed projects that we are constructing or expect to construct. Such table excludes remaining performance obligations for any sales arrangements that had not fully satisfied the criteria to be considered a contract with a customer pursuant to the requirements of ASC 606. We expect to recognize $0.7 billion of revenue for such contracts through the later of the substantial completion or the closing dates of the projects.

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Project/Location	Project Size in MW_{AC}	Revenue Category	EPC Contract/Partner Developed Project	Expected Year Revenue Recognition Will Be Completed	% of Revenue Recognized
Phoebe, Texas	250	EPC	Innergix Renewable Energy	2019	12%
GA Solar 4, Georgia (1)	200	Solar power systems	Origis Energy USA	2020	11%
Rosamond, California	150	Solar power systems	Clearway Energy Group	2019	57%
Willow Springs, California	100	Solar power systems	D.E. Shaw Renewable Investments	2019	96%
Grange Hall, Florida	61	EPC	Tampa Electric Company	2019	98%
Peace Creek, Florida	55	EPC	Tampa Electric Company	2019	70%
Troy Solar, Indiana	51	EPC	Southern Indiana Gas and Electric Company	2020	—%
Lake Hancock, Florida	50	EPC	Tampa Electric Company	2019	34%
Total	917				

(1) Previously known as the Twiggs County Solar project

As of December 31, 2018, we had entered into contracts with customers for the future sale of 8.9 GW_{DC} of solar modules for an aggregate transaction price of $3.2 billion. We expect to recognize such amounts as revenue through 2022 as we transfer control of the modules to the customers. As of December 31, 2018, we had also entered into long-term O&M contracts covering approximately 8 GW_{DC} of utility-scale PV solar power systems. We expect to recognize $0.5 billion of revenue during the noncancelable term of these O&M contracts over a weighted-average period of 11.5 years.

17. Stockholders' Equity

Preferred Stock

We have authorized 30,000,000 shares of undesignated preferred stock, $0.001 par value, none of which was issued and outstanding at December 31, 2018 and 2017. Our board of directors is authorized to determine the rights, preferences, and restrictions on any series of preferred stock that we may issue.

Common Stock

We have authorized 500,000,000 shares of common stock, $0.001 par value, of which 104,885,261 and 104,468,460 shares were issued and outstanding at December 31, 2018 and 2017, respectively. Each share of common stock is entitled to a single vote. We have not declared or paid any dividends through December 31, 2018.

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18. Share-Based Compensation

The following table presents share-based compensation expense recognized in our consolidated statements of operations for the years ended December 31, 2018, 2017, and 2016 (in thousands):

	2018	2017	2016
Cost of sales	$6,422	$6,809	$7,598
Selling, general and administrative	21,646	22,165	17,830
Research and development	5,714	5,740	3,284
Production start-up	372	407	—
Total share-based compensation expense	$34,154	$35,121	$28,712

The following table presents share-based compensation expense by type of award for the years ended December 31, 2018, 2017, and 2016 (in thousands):

	2018	2017	2016
Restricted and performance stock units	$32,223	$32,309	$25,076
Unrestricted stock	1,637	1,757	1,677
Stock purchase plan	—	394	1,332
	33,860	34,460	28,085
Net amount released from inventory	294	661	627
Total share-based compensation expense	$34,154	$35,121	$28,712

Share-based compensation expense capitalized in inventory was $1.8 million and $2.1 million as of December 31, 2018 and 2017, respectively. As of December 31, 2018, we had $37.6 million of unrecognized share-based compensation expense related to unvested restricted and performance stock units, which we expect to recognize over a weighted-average period of approximately 1.1 years. During the years ended December 31, 2018, 2017, and 2016, we recognized an income tax benefit in our statement of operations of $9.9 million, $6.2 million, and $32.9 million, respectively, related to share-based compensation expense, including any excess tax benefits or deficiencies. We authorize our transfer agent to issue new shares, net of shares withheld for taxes as appropriate, for the vesting of restricted and performance stock units or grants of unrestricted stock.

Share-Based Compensation Plans

During the year ended December 31, 2015, we adopted our 2015 Omnibus Incentive Compensation Plan (“the 2015 Omnibus Plan”), under which directors, officers, employees, and consultants of First Solar (including any of its subsidiaries) are eligible to participate in various forms of share-based compensation. The 2015 Omnibus Plan is administered by the compensation committee of our board of directors (or any other committee designated by our board of directors), which is authorized to, among other things, determine the recipients of grants, the exercise price, and the vesting schedule of any awards made under the 2015 Omnibus Plan. Our board of directors may amend, modify, or terminate the 2015 Omnibus Plan without the approval of our stockholders, except for amendments that would increase the maximum number of shares of our common stock available for awards under the 2015 Omnibus Plan, increase the maximum number of shares of our common stock that may be delivered by incentive stock options, or modify the requirements for participation in the 2015 Omnibus Plan.

The 2015 Omnibus Plan provides for the grant of incentive stock options, non-qualified stock options, stock appreciation rights, restricted shares, restricted stock units, performance units, cash incentive awards, performance compensation awards, and other equity-based and equity-related awards. In addition, the shares underlying any forfeited, expired, terminated, or canceled awards, or shares surrendered as payment for taxes required to be withheld, become available for new award grants. We may not grant awards under the 2015 Omnibus Plan after 2025, which is the tenth anniversary of the 2015 Omnibus Plan’s approval by our stockholders. As of December 31, 2018, we had

2,960,873 shares available for future issuance under the 2015 Omnibus Plan.

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Restricted and Performance Stock Units

We issue shares to the holders of restricted stock units on the date the restricted units vest. The majority of shares issued are net of applicable withholding taxes, which we pay on behalf of our associates. As a result, the actual number of shares issued will be less than the number of restricted stock units granted. Prior to vesting, restricted stock units do not have dividend equivalent rights or voting rights, and the shares underlying the restricted stock units are not considered issued and outstanding.

In February 2017, the compensation committee of our board of directors approved a long-term incentive program for key executive officers and associates. The program is intended to incentivize retention of our key executive talent, provide a smooth transition from our former key senior talent equity performance program (“KSTEPP”), and align the interests of executive management and stockholders. Specifically, the program consists of (i) performance stock units to be earned over an approximately three-year performance period beginning in March 2017 and (ii) stub-year grants of separate performance stock units to be earned over an approximately two-year performance period also beginning in March 2017. Vesting of the March 2017 performance stock units is contingent upon the relative attainment of target cost per watt and operating expense metrics. In April 2018, in continuation of our long-term incentive program for key executive officers and associates, the compensation committee of our board of directors approved additional grants of performance stock units to be earned over an approximately three-year performance period beginning in May 2018. Vesting of the May 2018 performance stock units is contingent upon the relative attainment of target gross margin, operating expense, and contracted revenue metrics. Vesting of performance stock units is also contingent upon the employment of program participants through the applicable vesting dates, with limited exceptions in case of death, disability, a qualifying retirement, or a change-in-control of First Solar. Performance stock units were included in the computation of diluted net income per share for the years ended December 31, 2018 and 2017 based on the number of shares that would be issuable if the end of the reporting period were the end of the contingency period.

Our board of directors previously approved and adopted the KSTEPP, a performance unit program under our prior 2010 Omnibus Incentive Compensation Plan applicable to our senior executives. The KSTEPP rewarded achievement of certain performance objectives aligned to the success of our long-term strategic plans. Such performance objectives included KSTEPP adjusted operating income, sales in key geographic markets, and cash adjusted return on invested capital. The KSTEPP awards were designed so that the attainment of the performance criteria required for full or partial vesting would be attained over time. In July 2016, the compensation committee of our board of directors certified the achievement of the full KSTEPP vesting conditions for the rolling annual period ended June 30, 2016. Accordingly, the remaining two-thirds of each KSTEPP award vested in 2016, and each KSTEPP participant received one share of common stock for each vested KSTEPP performance unit, net of any forfeitures.

The following is a summary of our restricted stock unit activity, including performance stock unit activity, for the year ended December 31, 2018:

	Number of Shares	Weighted-Average Grant-Date Fair Value
Unvested restricted stock units at December 31, 2017	2,302,906	$ 38.55
Restricted stock units granted (1)	739,855	67.44
Restricted stock units vested	(490,682)	44.46
Restricted stock units forfeited	(77,792)	51.04
Unvested restricted stock units at December 31, 2018	2,474,287	$ 45.63

(1) Restricted stock units granted include the maximum amount of performance stock units available for issuance under our long-term incentive program for key executive officers and associates. The actual number of shares to be issued will depend on the relative attainment of the performance metrics described above.

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We estimate the fair value of our restricted stock unit awards based on our stock price at the grant date. For the years ended December 31, 2017 and 2016, the weighted-average grant-date fair value for restricted stock units granted in such years was $32.81 and $59.64, respectively. The total fair value of restricted stock units vested during 2018, 2017, and 2016 was $32.2 million, $14.1 million, and $131.0 million, respectively.

Unrestricted Stock

During the years ended December 31, 2018, 2017, and 2016, we awarded 31,190; 42,773; and 38,429, respectively, of fully vested, unrestricted shares of our common stock to the independent members of our board of directors. Accordingly, we recognized $1.6 million, $1.8 million, and $1.7 million of share-based compensation expense for these awards during the years ended December 31, 2018, 2017, and 2016, respectively.

Stock Purchase Plan

Our shareholders approved our stock purchase plan for employees in June 2010. The plan allows employees to purchase our common stock through payroll withholdings over a six-month offering period at a discount from the closing share price on the last day of the offering period. In April 2017, we amended our stock purchase plan to reduce the purchase discount from 15% to 4%. Accordingly, the plan is considered noncompensatory and no longer results in the recognition of share-based compensation expense.

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19. Income Taxes

In December 2017, the United States enacted the Tax Act, which significantly revised U.S. tax law by, among other things, lowering the statutory federal corporate income tax rate from 35% to 21% effective January 1, 2018, eliminating certain deductions, imposing a transition tax on certain accumulated earnings and profits of foreign corporate subsidiaries, introducing new tax regimes, and changing how foreign earnings are subject to U.S. tax. In December 2017, the SEC issued Staff Accounting Bulletin No. 118 to (i) clarify certain aspects of accounting for income taxes under ASC 740 in the reporting period the Tax Act was signed into law when information is not yet available or complete and (ii) provide a measurement period up to one year to complete the accounting for the Tax Act. We completed our accounting for the Tax Act in the fourth quarter of 2018 and recorded certain adjustments to our provisional tax expenses.

As a result of the Tax Act, we remeasured certain deferred tax assets and liabilities based on the tax rate applicable to when the temporary differences are expected to reverse in the future, which is generally 21%, and recorded a provisional tax expense of $6.6 million for the year ended December 31, 2017. During the year ended December 31, 2018, we reduced our provisional tax expense for the remeasurement of deferred tax assets and liabilities by $2.3 million. The transition tax of the Tax Act was based on our total post-1986 foreign earnings and profits, which we previously deferred from U.S. income taxes under prior tax law. During the year ended December 31, 2017, we recorded a provisional transition tax expense of $401.5 million, which we reduced by $8.1 million during the year ended December 31, 2018. We elected to pay the transition tax over an eight-year period, and our outstanding transition tax liability was $81.2 million as of December 31, 2018 after the utilization of certain tax credits and tax losses and our initial installment payment in 2018. Our measurement period adjustments for the remeasurement of deferred tax assets and liabilities and the transition tax reduced our effective tax rate by 9.2% for the year ended December 31, 2018.

Although we continue to evaluate our plans for the reinvestment or repatriation of unremitted foreign earnings, we expect to indefinitely reinvest the earnings of our foreign subsidiaries to fund our international operations, with the exception of our subsidiaries in Canada and Germany. Accordingly, we have not recorded any provision for additional U.S. or foreign withholding taxes related to the outside basis differences of our foreign subsidiaries in which we expect to indefinitely reinvest their earnings.

The Tax Act subjects a U.S. shareholder to tax on global intangible low-taxed income (“GILTI”) earned by foreign corporate subsidiaries. Accordingly, we record taxes due on future U.S. inclusions in taxable income related to GILTI as a current-period expense when incurred (i.e., “period cost method”). Such policy election did not result in any estimated GILTI inclusions in our effective tax rate for the year ended December 31, 2018. The base erosion anti-abuse tax (“BEAT”) provisions of the Tax Act impose a minimum tax related to certain deductible payments made to related foreign persons. In addition, the foreign-derived intangible income (“FDII”) provision of the Tax Act allows a U.S. corporation to deduct 37.5% of its foreign-derived intangible income. The BEAT and FDII provisions of the Tax Act did not have a material impact on our income tax expense for the year ended December 31, 2018.

The U.S. and non-U.S. components of our income or loss before income taxes for the years ended December 31, 2018, 2017, and 2016 were as follows (in thousands):

	2018	2017	2016
U.S. income	$(49,353)	$(22,868)	$(426,791)
Non-U.S. income	162,500	224,983	(110,460)
Income (loss) before taxes and equity in earnings	$113,147	$202,115	$(537,251)

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The components of our income tax expense or benefit for the years ended December 31, 2018, 2017, and 2016 were as follows (in thousands):

	2018	2017	2016
Current (benefit) expense:			
Federal	$(44,267)	$116,956	$(14,389)
State	(13,568)	3,009	1,303
Foreign	8,788	11,099	(29,009)
Total current (benefit) expense	(49,047)	131,064	(42,095)
Deferred expense:			
Federal	31,530	226,570	90,319
State	2,387	5,335	(9,536)
Foreign	18,571	9,027	(15,521)
Total deferred expense	52,488	240,932	65,262
Total income tax expense	$3,441	$371,996	$23,167

Our Malaysian subsidiary has been granted a long-term tax holiday that expires in 2027. The tax holiday, which generally provides for a full exemption from Malaysian income tax, is conditional upon our continued compliance with meeting certain employment and investment thresholds, which we are currently in compliance with and expect to continue to comply with through the expiration of the tax holiday in 2027.

Our income tax results differed from the amount computed by applying the relevant U.S. statutory federal corporate income tax rate to our income or loss before income taxes for the following reasons for the years ended December 31, 2018, 2017, and 2016 (in thousands):

	2018		2017		2016	
	Tax	Percent	Tax	Percent	Tax	Percent
Statutory income tax expense (benefit)	$23,761	21.0 %	$70,740	35.0 %	$(188,038)	35.0 %
Provisional effect of Tax Act	—	— %	408,090	201.9 %	—	— %
Changes in valuation allowance	19,064	16.8 %	9,534	4.7 %	2,412	(0.4)%
Foreign tax rate differential	14,117	12.5 %	(22,048)	(10.9)%	6,833	(1.3)%
State tax, net of federal benefit	(7,580)	(6.7)%	4,397	2.2 %	(8,655)	1.6 %
Non-deductible expenses	4,636	4.1 %	2,703	1.3 %	324	— %
Share-based compensation	(2,105)	(1.9)%	1,161	0.6 %	(23,283)	4.3 %
Change in tax contingency	(6,273)	(5.5)%	959	0.5 %	(34,541)	6.4 %
Foreign dividend income	16,570	14.6 %	540	0.3 %	248,013	(46.2)%
Goodwill	—	— %	—	— %	22,468	(4.2)%
Tax credits	(8,431)	(7.5)%	(18,445)	(9.1)%	(15,435)	2.9 %
Return to provision adjustments	(25,307)	(22.3)%	(35,191)	(17.4)%	11,757	(2.2)%
Effect of tax holiday	(26,277)	(23.2)%	(46,643)	(23.1)%	4,640	(0.9)%
Other	1,266	1.1 %	(3,801)	(1.9)%	(3,328)	0.7 %
Reported income tax expense	$3,441	3.0 %	$371,996	184.1 %	$23,167	(4.3)%

During the years ended December 31, 2018, 2017, and 2016, we made net tax payments of $58.8 million, $1.2 million, and $1.9 million, respectively.

In May 2017, the U.S. federal income tax authority accepted our election to classify certain of our German subsidiaries as disregarded entities of First Solar, Inc. effective January 1, 2017. Accordingly, we recorded an estimated benefit of $42.1 million through the tax provision to establish a deferred tax asset for excess foreign tax credits generated as a result of the associated election.

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In July 2016, we received a letter from a foreign tax authority confirming our residency status in that jurisdiction. In accordance with the letter, we reversed a liability associated with an uncertain tax position related to the income of a foreign subsidiary. Accordingly, we recorded a benefit of $35.4 million through the tax provision from the reversal of such liability.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities calculated under U.S. GAAP and the amounts calculated for preparing our income tax returns. The items that gave rise to our deferred taxes as of December 31, 2018 and 2017 were as follows (in thousands):

	2018	2017
Deferred tax assets:		
Net operating losses	$108,149	$124,281
Accrued expenses	55,754	62,345
Property, plant and equipment	18,796	35,104
Compensation	18,564	9,442
Goodwill	9,223	12,140
Long-term contracts	4,967	4,554
Inventory	4,079	7,601
Capitalized interest	2,948	—
Equity in earnings	2,693	—
Deferred expenses	2,165	2,057
Other	17,373	12,584
Deferred tax assets, gross	244,711	270,108
Valuation allowance	(159,546)	(143,818)
Deferred tax assets, net of valuation allowance	85,165	126,290
Deferred tax liabilities:		
Restricted investments and derivatives	(7,586)	(10,680)
Acquisition accounting / basis difference	(5,420)	(5,880)
Investments in foreign subsidiaries	(4,425)	(9,555)
Equity in earnings	—	(40,339)
Capitalized interest	—	(1,722)
Other	(3,093)	(7,541)
Deferred tax liabilities	(20,524)	(75,717)
Net deferred tax assets and liabilities	$64,641	$50,573

We use the deferral method of accounting for investment tax credits under which the credits are recognized as reductions in the carrying value of the related assets. The use of the deferral method also results in a basis difference from the recognition of a deferred tax asset and an immediate income tax benefit for the future tax depreciation of the related assets. Such basis differences are accounted for pursuant to the income statement method.

Changes in the valuation allowance against our deferred tax assets were as follows during the years ended December 31, 2018, 2017, and 2016 (in thousands):

	2018	2017	2016
Valuation allowance, beginning of year	$143,818	$123,936	$121,524
Additions	29,359	27,591	13,933
Reversals	(13,631)	(7,709)	(11,521)
Valuation allowance, end of year	$159,546	$143,818	$123,936

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We maintained a valuation allowance of $159.5 million and $143.8 million as of December 31, 2018 and 2017, respectively, against certain of our deferred tax assets, as it is more likely than not that such amounts will not be fully realized. During the year ended December 31, 2018, the valuation allowance increased by $15.7 million primarily due to current year operating losses in certain jurisdictions and an increase in deferred tax assets with a full valuation allowance due to a change in foreign exchange rates. These increases were partially offset by the release of valuation allowances in jurisdictions with current year operating income.

As of December 31, 2018, we had federal and aggregate state net operating loss carryforwards of $10.3 million and $72.9 million, respectively. As of December 31, 2017, we had federal and aggregate state net operating loss carryforwards of $11.7 million and $20.3 million, respectively. If not used, the federal net operating loss carryforwards incurred prior to 2018 will begin to expire in 2030, and the state net operating loss carryforwards will begin to expire in 2029. Federal net operating losses arising in tax years beginning in 2018 may be carried forward indefinitely but may not be carried back, and the associated deduction is limited to 80% of taxable income. The utilization of our net operating loss carryforwards is also subject to an annual limitation under Section 382 of the Internal Revenue Code due to changes in ownership. Based on our analysis, we do not believe such limitation will impact our realization of the net operating loss carryforwards as we anticipate utilizing them prior to expiration. During the year ended December 31, 2017, we utilized substantially all of our gross federal and state R&D credit carryforwards, U.S. foreign tax credit carryforwards, and investment tax credits to reduce our transition tax liability.

A reconciliation of the beginning and ending amount of liabilities associated with uncertain tax positions for the years ended December 31, 2018, 2017, and 2016 is as follows (in thousands):

	2018	2017	2016
Unrecognized tax benefits, beginning of year	$84,173	$89,256	$141,755
Increases related to prior year tax positions	—	3,827	—
Decreases related to prior year tax positions	(2,979)	—	(6,119)
Decreases from lapse in statute of limitations	(10,704)	(11,840)	(14,421)
Decreases relating to settlements with authorities	—	(2,494)	(35,416)
Increases related to current tax positions	1,703	5,424	3,457
Unrecognized tax benefits, end of year	$72,193	$84,173	$89,256

If recognized, $70.4 million of unrecognized tax benefits, excluding interest and penalties, would reduce our annual effective tax rate. Due to the uncertain and complex application of tax laws and regulations, it is possible that the ultimate resolution of uncertain tax positions may result in liabilities that could be materially different from these estimates. In such an event, we will record additional tax expense or benefit in the period in which such resolution occurs. Our policy is to recognize any interest and penalties that we may incur related to our tax positions as a component of income tax expense. During the years ended December 31, 2018 and 2017, we recognized interest and penalties of $5.3 million and $5.5 million, respectively, related to unrecognized tax benefits. We did not recognize any interest or penalties related to unrecognized tax benefits during 2016. It is reasonably possible that less than $0.1 million of uncertain tax positions will be recognized within the next 12 months due to the expiration of the statute of limitations associated with such positions.

We are subject to audit by federal, state, local, and foreign tax authorities. During the year ended December 31, 2017, we settled certain examinations in Germany, which resulted in a discrete tax expense of $2.5 million. We are currently under examination in Chile, India, Malaysia, Singapore, and the state of California. We believe that adequate provisions have been made for any adjustments that may result from tax examinations. However, the outcome of tax examinations cannot be predicted with certainty. If any issues addressed by our tax examinations are not resolved in a manner consistent with our expectations, we could be required to adjust our provision for income taxes in the period such resolution occurs.

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The following table summarizes the tax years that are either currently under audit or remain open and subject to examination by the tax authorities in the most significant jurisdictions in which we operate:

	Tax Years
Australia	2013 - 2017
India	2013 - 2018
Malaysia	2013 - 2017
United States	2008 - 2009; 2013 - 2017

In certain of the jurisdictions noted above, we operate through more than one legal entity, each of which has different open years subject to examination. The table above presents the open years subject to examination for the most material of the legal entities in each jurisdiction. Additionally, tax years are not closed until the statute of limitations in each jurisdiction expires. In the jurisdictions noted above, the statute of limitations can extend beyond the open years subject to examination.

20. Net Income (Loss) per Share

Basic net income (loss) per share is computed by dividing net income (loss) by the weighted-average number of common shares outstanding for the period. Diluted net income per share is computed giving effect to all potentially dilutive common shares, including restricted and performance stock units and stock purchase plan shares, unless there is a net loss for the period. In computing diluted net income per share, we utilize the treasury stock method.

The calculation of basic and diluted net income (loss) per share for the years ended December 31, 2018, 2017, and 2016 was as follows (in thousands, except per share amounts):

	2018	2017	2016
Basic net income (loss) per share			
Numerator:			
Net income (loss)	$144,326	$(165,615)	$(416,112)
Denominator:			
Weighted-average common shares outstanding	104,745	104,328	102,866
Diluted net income (loss) per share			
Denominator:			
Weighted-average common shares outstanding	104,745	104,328	102,866
Effect of restricted and performance stock units and stock purchase plan shares	1,368	—	—
Weighted-average shares used in computing diluted net income (loss) per share	106,113	104,328	102,866
Net income (loss) per share:			
Basic	$1.38	$(1.59)	$(4.05)
Diluted	$1.36	$(1.59)	$(4.05)

The following table summarizes the potential shares of common stock that were excluded from the computation of diluted net income per share for the years ended December 31, 2018, 2017, and 2016 as such shares would have had an anti-dilutive effect (in thousands):

	2018	2017	2016
Anti-dilutive shares	299	1,021	753

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21. Accumulated Other Comprehensive (Loss) Income

The following table presents the changes in accumulated other comprehensive (loss) income, net of tax, for the year ended December 31, 2018 (in thousands):

	Foreign Currency Translation Adjustment	Unrealized Gain (Loss) on Marketable Securities and Restricted Investments	Unrealized Gain (Loss) on Derivative Instruments	Total
Balance as of December 31, 2017	$ (65,346)	$ 68,388	$ (783)	$ 2,259
Other comprehensive loss before reclassifications	(1,034)	(6,077)	(3,760)	(10,871)
Amounts reclassified from accumulated other comprehensive (loss) income	—	(55,405)	6,812	(48,593)
Net tax effect	—	3,735	(996)	2,739
Net other comprehensive (loss) income	(1,034)	(57,747)	2,056	(56,725)
Balance as of December 31, 2018	$ (66,380)	$ 10,641	$ 1,273	$ (54,466)

The following table presents the pretax amounts reclassified from accumulated other comprehensive (loss) income into our consolidated statements of operations for the years ended December 31, 2018, 2017, and 2016 (in thousands):

Comprehensive Income Components	Income Statement Line Item	Amounts Reclassified for the Year Ended December 31,		
		2018	2017	2016
Unrealized gain on marketable securities and restricted investments	Other income, net	$ 55,405	$ 49	$ 41,633
Unrealized (loss) gain on derivative contracts:				
Foreign exchange forward contracts	Net sales	(1,698)	—	—
Foreign exchange forward contracts	Cost of sales	(212)	—	—
Foreign exchange forward contracts	Foreign currency loss, net	(5,448)	—	—
Cross currency swap contract	Foreign currency loss, net	—	—	4,896
Foreign exchange forward, interest rate, and cross currency swap contracts	Interest expense, net	—	—	(1,704)
Foreign exchange forward contracts	Other income, net	546	(189)	—
		(6,812)	(189)	3,192
Total amount reclassified		$ 48,593	$ (140)	$ 44,825

22. Segment and Geographical Information

We operate our business in two segments. Our modules segment involves the design, manufacture, and sale of CdTe solar modules, which convert sunlight into electricity. Third-party customers of our modules segment include integrators and operators of PV solar power systems. Our second segment is our fully integrated systems segment, through which we provide complete turn-key PV solar power systems, or solar solutions, that draw upon our capabilities, which include (i) project development, (ii) EPC services, and (iii) O&M services. We may provide our full EPC services or any combination of individual products and services within our EPC capabilities depending upon the customer and market opportunity. All of our systems segment products and services are for PV solar power systems, which primarily use our solar modules, and we sell such products and services to utilities, independent power producers, commercial and industrial companies, and other system owners. Additionally within our systems segment, we may temporarily own and operate certain of our systems for a period of time based on strategic opportunities or market factors.

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Our segments are managed by our Chief Executive Officer, who is also considered our chief operating decision maker ("CODM"). Our CODM views sales of solar modules or systems as the primary drivers of our resource allocation, profitability, and cash flows. Our modules segment contributes to our operating results by providing the fundamental technologies and solar modules that drive our business and sales opportunities, and our systems segment contributes to our operating results by using such modules as part of a range of comprehensive PV solar energy solutions, depending on the customer and market opportunity. Our CODM generally makes decisions about allocating resources to our segments and assessing their performance based on gross profit. However, information about segment assets is not reported to the CODM for purposes of making such decisions. Accordingly, we exclude such asset information from our reportable segment financial disclosures.

The following tables present certain financial information for our reportable segments for the years ended December 31, 2018, 2017, and 2016 (in thousands):

	Year Ended December 31, 2018		
	Modules	Systems	Total
Net sales	$502,001	$1,742,043	$2,244,044
Gross (loss) profit	(50,467)	442,644	392,177
Depreciation and amortization expense	85,797	18,647	104,444
Goodwill	14,462	—	14,462

	Year Ended December 31, 2017		
	Modules	Systems	Total
Net sales	$806,398	$2,134,926	$2,941,324
Gross profit	112,338	436,609	548,947
Depreciation and amortization expense	67,597	24,302	91,899
Goodwill	14,462	—	14,462

	Year Ended December 31, 2016		
	Modules	Systems	Total
Net sales	$675,452	$2,229,111	$2,904,563
Gross profit	110,510	527,908	638,418
Depreciation and amortization expense	186,736	17,515	204,251

The following table presents net sales for the years ended December 31, 2018, 2017, and 2016 by geographic region, based on the customer country of invoicing (in thousands):

	2018	2017	2016
United States	$1,478,034	$2,273,774	$2,418,974
Japan	234,814	4,405	5,183
India	232,130	141,491	158,182
Australia	153,163	108,643	9,568
Turkey	19,354	124,433	18,809
Jordan	2,150	2,255	103,022
Spain	741	379	141,319
All other foreign countries	123,658	285,944	49,506
Net sales	$2,244,044	$2,941,324	$2,904,563

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The following table presents long-lived assets, which include property, plant and equipment, PV solar power systems, and project assets (current and noncurrent) as of December 31, 2018 and 2017 by geographic region, based on the physical location of the assets (in thousands):

	2018	2017
Vietnam	$702,071	$252,417
United States	659,854	595,062
Malaysia	532,418	483,884
Japan	319,571	251,559
Chile	240,495	251,208
All other foreign countries	108,871	240,232
Long-lived assets	$2,563,280	$2,074,362

23. Concentrations of Risks

Customer Concentration. The following customers each comprised 10% or more of our total net sales and/or 10% or more of our total accounts receivable for the years ended December 31, 2018, 2017, and 2016:

	2018		2017		2016	
	% of Net Sales	% of A/R	% of Net Sales	% of A/R	% of Net Sales	% of A/R
Customer #1	16%	*	*	*	*	*
Customer #2	13%	*	47%	*	*	*
Customer #3	*	18%	*	*	*	*
Customer #4	*	12%	*	*	*	*
Customer #5	*	*	*	26%	*	*
Customer #6	*	*	*	12%	*	*
Customer #7	*	*	*	*	39%	*
Customer #8	*	*	*	*	11%	*
Customer #9	*	*	*	*	10%	*
Customer #10	*	*	*	*	*	32%
Customer #11	*	*	*	*	*	12%

* Net sales and/or accounts receivable for these customers were less than 10% of our total net sales and/or accounts receivable for the period.

Geographic Risk. During the year ended December 31, 2018, our third-party solar module and solar power system net sales were predominantly in the United States. The concentration of our net sales in a limited number of geographic regions exposes us to local economic, public policy, and regulatory risks in such regions.

Production. Our products include components that are available from a limited number of suppliers or sources. Shortages of essential components could occur due to increases in demand or interruptions of supply, thereby adversely affecting our ability to meet customer demand for our products. Our solar modules are currently produced at our facilities in Perrysburg, Ohio; Kulim, Malaysia; and Ho Chi Minh City, Vietnam. Damage to or disruption of these facilities could interrupt our business and adversely affect our ability to generate net sales.

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INDEX TO EXHIBITS

The following exhibits are filed with or incorporated by reference into this Annual Report on Form 10-K:

		Incorporated by Reference			
Exhibit Number	Exhibit Description	Form	File No.	Date of First Filing	Exhibit Number
3.1	Amended and Restated Certificate of Incorporation of First Solar, Inc.	S-1/A	333-135574	10/25/06	3.1
3.2	Amended and Restated Bylaws of First Solar, Inc.	10-Q	001-33156	5/5/17	3.1
10.1	Form of Change in Control Severance Agreement	S-1/A	333-135574	10/25/06	10.15
10.2	Form of Director and Officer Indemnification Agreement	10-K	001-33156	2/27/13	10.20
10.3	Credit Agreement, dated as of September 4, 2009, among First Solar, Inc., First Solar Manufacturing GmbH, the lenders party thereto, JPMorgan Chase Bank, N.A., as Administrative Agent, Bank of America and The Royal Bank of Scotland plc, as Documentation Agents, and Credit Suisse, Cayman Islands Branch, as Syndication Agent	8-K	001-33156	9/10/09	10.1
10.4	Charge of Company Shares, dated as of September 4, 2009, between First Solar, Inc., as Chargor, and JPMorgan Chase Bank, N.A., as Security Agent, relating to 66% of the shares of First Solar FE Holdings Pte. Ltd. (Singapore)	8-K	001-33156	9/10/09	10.2
10.5	German Share Pledge Agreements, dated as of September 4, 2009, between First Solar, Inc., First Solar Holdings GmbH, First Solar Manufacturing GmbH, First Solar GmbH, and JPMorgan Chase Bank, N.A., as Administrative Agent	8-K	001-33156	9/10/09	10.3
10.6	Guarantee and Collateral Agreement, dated as of September 4, 2009, by First Solar, Inc. in favor of JPMorgan Chase Bank, N.A., as Administrative Agent	8-K	001-33156	9/10/09	10.4
10.7	Guarantee, dated as of September 8, 2009, between First Solar Holdings GmbH, First Solar GmbH, First Solar Manufacturing GmbH, as German Guarantors, and JPMorgan Chase Bank, N.A., as Administrative Agent	8-K	001-33156	9/10/09	10.5
10.8	Assignment Agreement, dated as of September 4, 2009, between First Solar Holdings GmbH and JPMorgan Chase Bank, N.A., as Administrative Agent	8-K	001-33156	9/10/09	10.6
10.9	Assignment Agreement, dated as of September 4, 2009, between First Solar GmbH and JPMorgan Chase Bank, N.A., as Administrative Agent	8-K	001-33156	9/10/09	10.7
10.10	Assignment Agreement, dated as of September 8, 2009, between First Solar Manufacturing GmbH and JPMorgan Chase Bank, N.A., as Administrative Agent	8-K	001-33156	9/10/09	10.8
10.11	Security Trust Agreement, dated as of September 4, 2009, between First Solar, Inc., First Solar Holdings GmbH, First Solar GmbH, First Solar Manufacturing GmbH, as Security Grantors, JPMorgan Chase Bank, N.A., as Administrative Agent, and the other Secured Parties party thereto	8-K	001-33156	9/10/09	10.9
10.12	Amended and Restated Credit Agreement, dated as of October 15, 2010, among First Solar, Inc., the borrowing subsidiaries party	8-K	001-33156	10/20/10	10.1

	thereto, the lenders party thereto, Bank of America N.A. and The Royal Bank of Scotland PLC, as documentation agents, Credit Suisse, Cayman Islands Branch, as syndication agent and JPMorgan Chase Bank, N.A., as administrative agent				
10.13	First Solar, Inc. 2010 Omnibus Incentive Compensation Plan	DEF 14A	001-33156	4/20/10	App. A
10.14	First Solar, Inc. Stock Purchase Plan	DEF 14A	001-33156	4/20/10	App. B

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Exhibit Number	Exhibit Description	Incorporated by Reference Form	File No.	Date of First Filing	Exhibit Number
10.15	Employment Agreement, dated March 15, 2011, and Change in Control Severance Agreement, dated April 4, 2011 between First Solar, Inc. and Mark Widmar	10-Q	001-33156	5/5/11	10.3
10.16	First Amendment, dated as of May 6, 2011, to the Amended and Restated Credit Agreement, dated as of October 15, 2010, among First Solar, Inc., the borrowing subsidiaries party thereto, the lenders party thereto, Bank of America, N.A. and The Royal Bank of Scotland plc, as documentation agents, Credit Suisse, Cayman Islands Branch, as syndication agent, and JPMorgan Chase Bank, N.A., as administrative agent	8-K	001-33156	5/12/11	10.1
10.17	Second Amendment and Waiver, dated as of June 30, 2011, to the Amended and Restated Credit Agreement, dated as of October 15, 2010, among First Solar, Inc., the lenders party thereto, Bank of America, N.A. and The Royal Bank of Scotland plc, as documentation agents, Credit Suisse, Cayman Islands Branch, as syndication agent, and JPMorgan Chase Bank, N.A., as administrative agent	8-K	001-33156	7/14/11	10.1
10.18	Employment Agreement, effective July 1, 2012, and Change in Control Severance Agreement, effective July 1, 2012 between First Solar, Inc. and Georges Antoun	10-Q	001-33156	8/3/12	10.1
10.19	Third Amendment, dated as of October 23, 2012 to the Amended and Restated Credit Agreement dated as of October 15, 2010, among First Solar, Inc., the lenders party thereto, Bank of America, N.A. and The Royal Bank of Scotland plc, as documentation agents, Credit Suisse, Cayman Islands Branch, as syndication agent, and JPMorgan Chase Bank, N.A., as administrative agent	8-K	001-33156	10/26/12	10.1
10.20	Non-Competition and Non-Solicitation Agreement, effective as of March 15, 2011, between First Solar, Inc. and Mark Widmar	10-Q	001-33156	5/7/13	10.2
10.21	Change in Control Severance Agreement, effective as of July 1, 2012, between First Solar, Inc. and Georges Antoun	10-Q	001-33156	5/7/13	10.3
10.22	Fourth Amendment dated as of July 15, 2013, to the Amended and Restated Credit Agreement, dated as of October 15, 2010, among First Solar, Inc., the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent	8-K	001-33156	7/19/13	10.1
10.23	Amended and Restated Guarantee and Collateral Agreement, dated as of July 15, 2013, by First Solar, Inc., First Solar Electric, LLC, First Solar Electric (California), Inc. and First Solar Development, LLC in favor of JPMorgan Chase Bank, N.A., as administrative agent	8-K	001-33156	7/19/13	10.2
10.24	Amendment to Change in Control Severance Agreement	10-Q	001-33156	8/7/13	10.1
10.25	Employment Agreement, effective March 3, 2014, and Change in Control Severance Agreement, effective March 3, 2014 between First Solar, Inc. and Paul Kaleta	10-K	001-33156	2/26/14	10.1
10.26	Restricted Cash Assignment of Deposits	10-Q	001-33156	8/6/14	10.2
10.27	First Solar, Inc. 2015 Omnibus Incentive Compensation Plan	DEF 14A	001-33156	4/8/15	App. A
10.28		8-K	001-33156	6/5/15	10.1

	Fifth Amendment, dated as of June 3, 2015, to the Amended and Restated Credit Agreement, dated as of October 15, 2010, among First Solar, Inc., the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent				
10.29	Employment Agreement, effective as of July 25, 2011, and Change in Control Severance Agreement, effective as of October 25, 2011 and amended as of August 1, 2013, between First Solar, Inc. and Philip Tymen deJong	10-K	001-33156	2/24/16	10.23

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Exhibit Number	Exhibit Description	Incorporated by Reference Form	File No.	Date of First Filing	Exhibit Number
10.30	Employment Agreement, effective as of May 1, 2012, and Change in Control Severance Agreement, effective as of May 1, 2012 and amended as of August 1, 2013, between First Solar, Inc. and Raffi Garabedian	10-K	001-33156	2/24/16	10.24
10.31	Employment Agreement, effective as of February 17, 2016, and Change in Control Severance Agreement, effective as of February 17, 2016 between First Solar, Inc. and Chris Bueter	10-K	001-33156	2/24/16	10.26
10.32	Amendment to Employment Agreement, effective as of July 1, 2016, between First Solar, Inc. and Mark Widmar, and Amendment to Non-Competition and Non-Solicitation Agreement, effective as of July 1, 2016, between First Solar, Inc. and Mark Widmar, and Second Amendment to Change-in-Control Severance Agreement, effective as of July 1, 2016, between First Solar, Inc. and Mark Widmar	10-Q	001-33156	4/28/16	10.1
10.33	Employment Agreement, effective as of October 24, 2016, and Change-in-Control Severance Agreement, effective as of October 24, 2016, between First Solar, Inc. and Alexander Bradley	10-Q	001-33156	11/3/16	10.1
10.34	Sixth Amendment, dated as of January 20, 2017, to the Amended and Restated Credit Agreement, dated as of October 15, 2010, among First Solar, Inc., the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent	8-K	001-33156	1/27/17	10.1
10.35	Form of Performance Unit Award Agreement - Form Perf Unit-006	10-K	001-33156	2/22/17	10.33
10.36	Form of Grant Notice for Executive Performance Equity Plan	10-Q	001-33156	5/5/17	10.1
10.37	Second Amended and Restated Credit Agreement, dated as of July 10, 2017, among First Solar, Inc., the borrowing subsidiaries party thereto, the lenders party thereto, and JPMorgan Chase Bank, N.A., as administrative agent	8-K	001-33156	7/14/17	10.10
10.38	Form of Grant Notice for Executive Performance Equity Plan	10-Q	001-33156	7/27/18	10.1
10.39	Form of Grant Notice for CEO Leadership Equity Plan	10-Q	001-33156	7/27/18	10.2
10.40	Form of Performance Unit Award Agreement - Form Perf Unit-008	10-Q	001-33156	7/27/18	10.3
*10.41	Amended and Restated Corporate Governance Guidelines dated November 9, 2017	—	—	—	—
*10.42	Form of RSU Award Agreement	—	—	—	—
*10.43	Form of Option Award Agreement	—	—	—	—
*10.44	Form of Share Award Agreement	—	—	—	—
*10.45	Form of Performance Unit Award Agreement - Form Perf Unit-009	—	—	—	—
*10.46	Form of Cash Incentive Award Agreement	—	—	—	—
*14.1	Code of Ethics	—	—	—	—
*21.1	List of Subsidiaries of First Solar, Inc.	—	—	—	—
*23.1	Consent of Independent Registered Public Accounting Firm	—	—	—	—
*31.01	Certification of Chief Executive Officer pursuant to Rule 13a-14(a) and 15d-14(a), as amended	—	—	—	—
*31.02	Certification of Chief Financial Officer pursuant to Rule 13a-14(a) and 15d-14(a), as amended	—	—	—	—
Δ*32.01	Certification of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section	—	—	—	—

	906 of the Sarbanes Oxley Act of 2002				
*101.INS	XBRL Instance Document	—	—	—	—
*101.SCH	XBRL Taxonomy Extension Schema Document	—	—	—	—
*101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document	—	—	—	—
*101.DEF	XBRL Definition Linkbase Document	—	—	—	—
*101.LAB	XBRL Taxonomy Label Linkbase Document	—	—	—	—

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Exhibit Number	Exhibit Description	Incorporated by Reference			
		Form	File No.	Date of First Filing	Exhibit Number
*101.PRE	XBLR Taxonomy Extension Presentation Document	—	—	—	—

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*Filed herewith.

Δ This exhibit shall not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934 or otherwise subject to the liabilities of that section, nor shall it be deemed incorporated by reference in any filing under the Securities Act of 1933 or the Securities Exchange Act of 1934, whether made before or after the date hereof and irrespective of any general incorporation language in any filings.

Item 16. Form 10-K Summary

None.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

	FIRST SOLAR, INC.	
February 21, 2019	By:	/s/ BRYAN SCHUMAKER
	Name:	Bryan Schumaker
	Title:	Chief Accounting Officer

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

Signature	Title	Date
/s/ MARK R. WIDMAR Mark R. Widmar	Chief Executive Officer and Director	February 21, 2019
/s/ ALEXANDER R. BRADLEY Alexander R. Bradley	Chief Financial Officer	February 21, 2019
/s/ MICHAEL J. AHEARN Michael J. Ahearn	Chairman of the Board of Directors	February 21, 2019
/s/ SHARON L. ALLEN Sharon L. Allen	Director	February 21, 2019
/s/ RICHARD D. CHAPMAN Richard D. Chapman	Director	February 21, 2019
/s/ GEORGE A. HAMBRO George A. Hambro	Director	February 21, 2019
/s/ MOLLY E. JOSEPH Molly Joseph	Director	February 21, 2019
/s/ CRAIG KENNEDY Craig Kennedy	Director	February 21, 2019
/s/ WILLIAM J. POST William J. Post	Director	February 21, 2019
/s/ PAUL H. STEBBINS Paul H. Stebbins	Director	February 21, 2019
/s/ MICHAEL SWEENEY Michael Sweeney	Director	February 21, 2019

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