Welcome to your CDP Climate Change Questionnaire 2019

C0. Introduction

C0.1

(C0.1) Give a general description and introduction to your organization.

First Solar, Inc. is a leading global provider of comprehensive photovoltaic (PV) solar energy solutions with over 20 gigawatts (GW) installed in 46 countries worldwide. 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 operations and maintenance (“O&M”) services to system owners. We have substantial, ongoing research and development 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. Our mission is to provide cost-advantaged solar technology through innovation, customer engagement, industry leadership, and operational excellence.

First Solar's proven solar solutions diversify the energy portfolio and reduce the risk of fuel-price volatility while delivering a levelized cost of electricity (LCOE) that is cost competitive with fossil fuels today. First Solar has set the benchmark for environmentally responsible product life cycle management by introducing the industry's first global and comprehensive recycling program for solar modules. We are committed to minimizing the environmental impacts and enhancing the social and economic benefits of our products and projects across their life cycle, from raw material sourcing through product end-of-life. For more information about First Solar, please visit www.firstsolar.com

First Solar was founded in 1999 and began commercial production in 2002. Since 2002 and through 2018, we have sold over 20 GW of PV solar modules. Assuming average worldwide irradiance and grid electricity emissions, our products are being used to displace approximately 14 million metric tons of CO2e per year during their 25+ year product life. This is equivalent to powering around 10 million average homes, planting 233 million trees and saving 36 billion liters of water (or 14000+ Olympic swimming pools) per year based on worldwide averages.

C0.2

(C0.2) State the start and end date of the year for which you are reporting data.

	Start date	End date	Indicate if you are providing emissions data for past reporting years

Row 1	January 1, 2018	December 31, 2018	No

C0.3

(C0.3) Select the countries/regions for which you will be supplying data.

Australia
Chile
Germany
India
Japan
Malaysia
Samoa
United States of America
Viet Nam

C0.4

(C0.4) Select the currency used for all financial information disclosed throughout your response.

USD

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your consolidation approach to your Scope 1 and Scope 2 greenhouse gas inventory.

Equity share

C1. Governance

C1.1

(C1.1) Is there board-level oversight of climate-related issues within your organization?

Yes

C1.1a

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.

Position of individual(s)	Please explain

Board-level committee	The Audit Committee of the Board of Directors has the highest level of oversight over risk management for the company. The annual enterprise risk assessment process includes identifying risks that would impact the company's achievement of strategic objectives. Thus, the assessment would consider climate-related risks as part of the enterprise risk management process.

C1.1b

(C1.1b) Provide further details on the board's oversight of climate-related issues.

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
Scheduled – some meetings	Reviewing and guiding strategy Reviewing and guiding risk management policies	Sustainability updates to the Board are scheduled on an annual or more frequent basis. Enterprise risk management updates are provided to the Board's Audit Committee at least annually or more frequently. Impacts, risks, and opportunities related to Climate Change may be included in these updates if they have a significant impact on the company's business and operations.

C1.2

(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.

Name of the position(s) and/or committee(s)	Responsibility	Frequency of reporting to the board on climate-related issues
Chief Operating Officer (COO)	Both assessing and managing climate-related risks and opportunities	Annually

C1.2a

(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored (do not include the names of individuals).

First Solar's Chief Operating Officer has the highest level of direct responsibility for climate change within the company. Leveraging sustainability as a business enabler is one of the COO's executive goals. First Solar's Chief Sustainability Officer reports into the Chief Operational Officer and is in charge of overseeing the company's global Environmental Health

and Safety (EHS), Sustainability and Recycling programs. The Chief Sustainability Officer provides regular sustainability updates to the executive leadership team and the Board.

The Chief Sustainability Officer also leads the company's Sustainability Council which is composed of senior leaders from Supply Chain, Government Affairs, EHS, Sustainability, Business Development, Technology & Product Development, Legal, Human Resources, Finance, as well as the Chief Operating Officer, the Chief Technology Officer and Chief Accounting Officer. The Sustainability Council promotes the implementation of cross-functional sustainability strategies and drives the company's sustainability goals, initiatives and programs with a focus on resource efficiency, supply chain risk management, transparency, and utilizing sustainability as a lever for growth. First Solar's corporate sustainability program drives the company's commitment to the triple bottom line of "people, planet and profit" through our approach to responsible life cycle management, environmental footprint analysis (from raw material sourcing through end-of-life recycling), greenhouse gas emissions intensity reduction, waste management, global charitable giving, operational cost reduction, and industry best practices such as responsible land use and our global PV module recycling services.

C1.3

(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?

Yes

C1.3a

(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).

Who is entitled to benefit from these incentives?

All employees

Types of incentives

Monetary reward

Activity incentivized

Other, please specify

Renewable energy products

Comment

Expansion of PV solar module production which enables more PV solar modules to be provided to customers and therefore to displace more electricity generation by fossil fuels. Our annual manufacturing capacity has grown from 25 megawatts (MW) in 2005 to more than 2,700 MW in 2018.

Who is entitled to benefit from these incentives?
All employees

Types of incentives
Monetary reward

Activity incentivized
Other, please specify
Renewable energy cost

Comment
Reductions in PV solar module manufacturing costs which reduce the costs of PV solar and thus allow PV solar to become more cost competitive with conventional technologies and helps PV solar become more widely deployed and accepted.

Who is entitled to benefit from these incentives?
All employees

Types of incentives
Monetary reward

Activity incentivized
Efficiency target

Comment
First Solar provides incentives to encourage our associates to drive the company's environmental strategy and continuous improvement. Improvements in PV solar module efficiency which drive reductions in the costs of PV solar thereby expanding PV markets and displacing electricity generated by fossil fuels. Improvements in efficiency also reduce the overall lifecycle carbon footprint of our product. As a result, our average module conversion efficiency has increased more than 70% over the past decade, from 9.5% in 2006 to 16.9% in 2018.

Who is entitled to benefit from these incentives?
All employees

Types of incentives
Monetary reward

Activity incentivized
Other, please specify
Renewable energy cost reduction

Comment

Reductions in PV solar balance of system (BoS) costs which reduces the total installed costs of PV solar and thus allows PV solar to become more cost competitive with conventional technologies and help PV become more widely deployed and accepted.

Who is entitled to benefit from these incentives?

All employees

Types of incentives

Monetary reward

Activity incentivized

Other, please specify

Expansion of renewable energy

Comment

Expanded PV markets and/or market segments (which help to develop emerging geographic markets for PV solar) and provide these markets with a cost-competitive alternative to electricity generated by fossil fuels.

Who is entitled to benefit from these incentives?

Management group

Types of incentives

Recognition (non-monetary)

Activity incentivized

Behavior change related indicator

Comment

Participation in leadership development programs, such as First Solar Way and Leadership Essentials, that focus on driving product improvements which helps to lower the carbon intensity of our products and also include other sustainability-related projects.

Who is entitled to benefit from these incentives?

Facilities manager

Types of incentives

Monetary reward

Activity incentivized

Energy reduction target

Comment

Energy saving targets are included in the performance goals of our facilities team. Since 2009, our manufacturing energy intensity has decreased by approximately 30% due to increased manufacturing throughput and module efficiency, as well as the implementation of energy conservation and low carbon initiatives.

Who is entitled to benefit from these incentives?

Chief Operating Officer (COO)

Types of incentives

Monetary reward

Activity incentivized

Other, please specify

Executive sustainability goal

Comment

Leveraging sustainability as a business enabler is one of the COO's executive goals which includes managing risks and identifying opportunities for growth e.g. operation cost reduction through reduced resource consumption and emissions. Executives are rewarded for achieving their operational goals and objectives.

Who is entitled to benefit from these incentives?

All employees

Types of incentives

Recognition (non-monetary)

Activity incentivized

Behavior change related indicator

Comment

In 2018, First Solar rolled out a global internal Sustainability Ambassadors Program which enables First Solar associates at various sites to identify and implement local sustainability initiatives while encouraging sustainable behavior change across the organization. First Solar Sustainability Ambassadors are recognized for their efforts to recycle and reduce waste as part of the company's global reduce-reuse-recycle campaign, conserve natural resources, engage in local communities, and minimize both the company's and their personal environmental footprints.

C2. Risks and opportunities

C2.1

(C2.1) Describe what your organization considers to be short-, medium- and long-term horizons.

	From (years)	To (years)	Comment
Short-term	0	3	Time horizon for assessing climate-related risks and opportunities is aligned with other business practice time horizons.
Medium-term	3	5	
Long-term	5	10	

C2.2

(C2.2) Select the option that best describes how your organization's processes for identifying, assessing, and managing climate-related issues are integrated into your overall risk management.

Integrated into multi-disciplinary company-wide risk identification, assessment, and management processes

C2.2a

(C2.2a) Select the options that best describe your organization's frequency and time horizon for identifying and assessing climate-related risks.

	Frequency of monitoring	How far into the future are risks considered?	Comment
Row 1	Annually	1 to 3 years	As part of our enterprise risk management (ERM) process, First Solar conducts an annual survey with the functional leaders. This team works from a top down approach to catalogue areas of risk to First Solar including regulatory risks, operational risks, reputational risks, market/ customer changes, business continuity risks including due to weather and other extreme events, technology risks, supply chain, organizational adaptability. These include climate change related risks and opportunities such as regulatory and other market drivers, uncertainty in market signals, and commodity price risks. The process involves a forward-looking view of enterprise risks and risk trends over a three-year horizon. The results are reviewed and analyzed by the

			executive leadership team and the Board's Audit Committee to guide the company's risk mitigation efforts.

C2.2b

(C2.2b) Provide further details on your organization's process(es) for identifying and assessing climate-related risks.

First Solar conducts an annual survey to obtain the company leadership's view of enterprise risks and risk trends over a three-year horizon. Functional leaders and risk owners (Director-level and above) are requested on an annual basis to complete the survey which has an 86% response rate. Risk owners may provide their own updates more frequently if needed. Risks are assessed on their likelihood and impact, based on residual risk, i.e. remaining risk after action and control activities to reduce the impact and likelihood of an adverse event have been undertaken. 24 risk statements were captured in the latest survey, including areas such as regulatory risks, operational risks, reputational risks, market/customer changes, technology risks, supply chain, organizational adaptability, and corporate sustainability. These include climate change related risks and opportunities such as regulatory and other market drivers, uncertainty in market signals, commodity price risks, and corporate sustainability. The survey input is then converted into a heatmap chart depicting each risk's likelihood and impact. The results are reviewed and analyzed by the executive leadership team and the Board's Audit Committee to guide the company's risk mitigation efforts. Updates to the annual survey are made semi-annually and provided to the Board's Audit Committee. Impacts, risks, and opportunities related to Climate Change may be included in these updates if they have a significant impact on the company's business and operations. Risks associated with individual assets (including risks due to weather and other extreme events) are assessed in the context of operational and/or business continuity risks. Asset level risks (e.g. natural disasters that affect individual facilities) and opportunities are assessed through semi-annual scorecards for our manufacturing sites. Our definition for a substantive financial impact is a direct loss or opportunity cost of more than $50 million (medium-high impact) to more than $100 million (high impact).

C2.2c

(C2.2c) Which of the following risk types are considered in your organization's climate-related risk assessments?

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	Climate change related risks associated with current regulations (e.g. the reduction or removal of clean energy programs and incentives which could result in decreased demand for our products) are captured under regulatory risks and are always included for evaluation in the company's ERM survey.
Emerging regulation	Relevant, always included	Risks associated with emerging regulations (e.g. new government regulations or utility policies pertaining to our modules, systems, and operation and maintenance services which could result in significant

		additional expenses or reduced product demand) are captured under regulatory risks and are always included for evaluation in the company's ERM survey.
Technology	Relevant, always included	Technology risks (e.g. failing to refine our technology and reduce costs could render our solar modules or systems uncompetitive) are always included for evaluation in the company's ERM survey.
Legal	Relevant, always included	Legal risks (e.g. failure to comply with legal or regulatory requirements including but not limited to Foreign Corrupt Practices Act, environmental, health and safety, anti-trust, misappropriating or infringing on intellectual property rights of third parties which could adversely impact our financial position or damage our reputation) are always included for evaluation in the company's ERM survey.
Market	Relevant, always included	Market risks (e.g. if utility-scale PV solar technology proves unsuitable for widespread adoption at economically attractive rate of return or if addition demand for solar modules and systems takes longer to develop than we anticipate) are always included for evaluation in the company's ERM survey.
Reputation	Relevant, always included	All ERM risks are evaluated for their potential impact on the company's reputation. A specific example of potential reputational risks would be problems with product quality and performance of our Series 4 and Series 6 modules which could cause us to incur significant and/or unexpected warranty and related expenses, damage our market reputation, and prevent us from maintaining or increasing our market share.
Acute physical	Relevant, always included	Risks associated with individual assets (including risks due to weather and other extreme events which could disrupt operations or the supply of raw materials) are assessed in the context of operational and/or business continuity risks. Asset level risks (e.g. natural disasters that affect individual manufacturing facilities) are assessed through semi-annual scorecards for our manufacturing sites.
Chronic physical	Relevant, always included	Chronic physical climate change risks such as water shortages and widespread extreme climates are included for evaluation in the company's ERM survey and the semi-annual scorecards for our manufacturing sites which assess operational and/or business continuity risks. As we increase the number of installations in extreme climates, we may experience increased failure rates due to deployment into such field conditions. Any widespread product failures may damage our market reputation, cause our net sales to decline, require us to repair or replace the defective modules or provide financial remuneration, and result in us taking voluntary remedial measures beyond those required by our standard warranty terms to enhance customer satisfaction, which could have a material adverse effect on our operating results.

Upstream	Relevant, always included	Supply chain disruptions and commodity price risks are always included for evaluation in the company's ERM survey. We are exposed to price risks for the raw materials, components, services, and energy costs used in the manufacturing of our solar modules and Balance of System (BoS) parts used in our systems. In addition, shortages of essential components could occur due to interruptions of supply, thereby adversely affecting our ability to meet customer demand for our products. 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.
Downstream	Relevant, always included	Downstream risks (e.g. exposure to price risks of services and energy costs in the transportation of our solar modules are captured under commodity and component risks and are always included for evaluation in the company's ERM survey.

C2.2d

(C2.2d) Describe your process(es) for managing climate-related risks and opportunities.

Risks and opportunities identified by the annual enterprise risk management (ERM) survey are reviewed and analyzed by our Executive Leadership Team, and help to prioritize the company's risk mitigating efforts in the next year. The Executive Leadership Team then assigns internal cross-functional teams to focus on and drive mitigation of those risks and pursue identified opportunities. ERM updates are provided to the Audit Committee of the Board of Directors on an annual or more frequent basis by the ELT and Director of Internal Audit. In addition, First Solar has specialized functional teams dedicated to providing oversight of the adequacy of internal processes and controls around key processes and operational areas. Examples of these teams include: Internal Audit, Environmental Health & Safety (EHS), Global Sustainability, Business Development, Supply Chain, Facility teams etc.

Physical climate change risks such as natural disasters that disrupt our operations or the utility and raw material supply to individual manufacturing facilities are managed by the facility teams and identified in our facility risk scorecards . We mitigate such risks by distributing our manufacturing capability across several sites and buildings and creating a separate production unit that creates a redundancy with our manufacturing process.

Transitional risks that impact the cost of our raw material supply (e.g. carbon taxes that can increase the costs of relatively energy-intensive raw materials such as glass) are managed by the supply chain team. To mitigate supply chain price risks, we strive to qualify multiple suppliers using a robust qualification process. When possible we attempt to use suppliers that

can provide a raw material supply source that is near our manufacturing locations, reducing the cost and lead times for such materials. Sourcing raw materials from nearby suppliers also helps to reduce transport- and shipping-related energy use and carbon emissions. 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). In addition, First Solar's recycling team developed a high-value recycling process that recovers over 90% of our semiconductor material for reuse in new modules and approximately 90% of the glass for use in new glass products. First Solar is proactively investing in recycling technology improvements with the ultimate aim of refining the quality of the recovered glass so it may be reused in new solar modules.

C2.3

(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.3a

(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Transition risk

Primary climate-related risk driver

Market: Uncertainty in market signals

Type of financial impact

Reduced demand for goods and/or services due to shift in consumer preferences

Company- specific description

Although we compete in key markets that do not require solar-specific government subsidies or support programs, our net sales and profits remain subject, in the near term, to regulation and variability based on the availability and size of government subsidies and economic incentives (e.g. quotas, renewable portfolio standards, and tendering systems) and financial incentives (e.g. tax incentives, grants, loans, rebates, and production incentives). The reduction, elimination, or expiration of government subsidies, economic incentives, tax incentives, renewable energy targets, and other

support for on-grid solar electricity applications, or other adverse public policies, such as tariffs or other trade remedies imposed on solar cells and modules, could negatively impact demand and/or price levels for our solar modules and systems and limit our growth or lead to a reduction in our net sales, thereby adversely impacting our operating results. Although we expect to become less impacted by, and less dependent on these forms of government support over time, such programs will continue to play varying roles in accelerating the adoption of PV solar power systems around the world. The 30% Investment Tax Credit (ITC) has been an important economic driver of solar installations in the U.S. Its extension through 2019 has contributed to greater medium-term demand visibility in the U.S. The positive impact of the ITC has depended to a large degree on the availability of tax equity for project financing, and any significant reduction in the availability of tax equity in the future could make it more difficult to develop and construct projects requiring financing. However, this risk is expected to decline over the next few years as utility ownership of solar is expected to increase.

Time horizon

Medium-term

Likelihood

Likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure – minimum (currency)

0

Potential financial impact figure – maximum (currency)

259,000,000

Explanation of financial impact figure

The 30% Investment Tax Credit (ITC) has been an important economic driver of solar installations in the U.S. which represented 66% of our net sales in 2018. Under a worst case scenario, if we assumed 66% of our gross profit (~$392 million) was impacted by a change in the ITC, the maximum potential financial impact is estimated to be ~$259 million. The more likely impact to our results would be much lower than this worst case scenario. Although the ITC step down would likely impact PV system volumes and pricing, we do not expect that all our U.S. sales would go away since it's not the only driver of solar demand. Electricity load growth and the competitiveness of solar pricing relative to other sources of generation also impact market demand.

Management method

We continue to devote substantial resources to our research and development efforts, which generally focus on continually improving the conversion efficiency and energy yield of our solar modules and lowering the levelized cost of electricity of our PV solar power systems. In 2018, we spent more than $84 million on research and development (or 3.8% of our net sales of $2.2. billion). Our PV solar energy solutions compete favorably on an economic basis with traditional forms of energy generation in multiple markets in the U.S. In addition to investing in research and development, we focus on developing long-lasting partnerships with strategic customers and becoming the partner of choice for utilities. With utility demand for solar PV expected to grow in the coming years, we anticipate that long-term solar ownership by utilities will continue to increase.

Cost of management

84,472,000

Comment

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Supply chain

Risk type

Transition risk

Primary climate-related risk driver

Market: Increased cost of raw materials

Type of financial impact

Increased production costs due to changing input prices (e.g., energy, water) and output requirements (e.g., waste treatement)

Company- specific description

First Solar is exposed to price risks for the raw materials, components, and energy costs used in the manufacturing and transportation of our solar modules and balance of system (BoS) parts used in our PV solar power systems. The imposition of carbon taxes for example could lead to increases in the costs of raw materials, such as glass, which have relatively high energy requirements for production. We may be unable to pass along changes in the costs of the raw materials and components for our products and systems to our customers.

Time horizon

Long-term

Likelihood

About as likely as not

Magnitude of impact

Medium-low

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

15,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Our cost of raw materials in 2018 amounted to $224 million. To estimate the financial implications of a carbon tax, we used the Interagency Working Group on Social Cost of Carbon's central estimate for a ton of CO2 emitted ($39). Assuming a carbon price of $39/ metric ton applied to our 2018 scope 3 emissions for purchased goods and services (388,421 metric tons CO2-eq), the cost of our purchased goods and services could increase by approximately $15 million.

Management method

To mitigate supply chain price risks, we strive to qualify multiple suppliers using a robust qualification process. When possible we attempt to use suppliers that can provide a raw material supply source that is near our manufacturing locations, reducing the cost and lead times for such materials. Sourcing raw materials from nearby suppliers also helps to reduce transport- and shipping-related energy use and carbon emissions. 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 excess raw materials that are not consumed within our operating cycle as “noncurrent”. Our non-current inventory in 2018 amounted to more than $130 million (compared to $113 million in 2017). In addition, First Solar's recycling team developed a high-value recycling process that recovers over 90% of our semiconductor material for reuse in new modules and approximately 90% of the glass for use in new glass products. First Solar is proactively investing in recycling technology improvements with the ultimate aim of refining the quality of the recovered glass so it may be reused in new solar modules.

Cost of management

130,000,000

Comment

Identifier

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type

Physical risk

Primary climate-related risk driver

Acute: Increased severity of extreme weather events such as cyclones and floods

Type of financial impact

Reduced revenue from decreased production capacity (e.g., transport difficulties, supply chain interruptions)

Company- specific description

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. Our asset-level (manufacturing plants) scorecards have identified natural disasters (such as earthquakes, tornadoes, hurricane, building collapse, flood, etc.) as a key risk driver that can impact our manufacturing plant's abilities to operate in Perrysburg, Ohio. Any damage to or disruption of our facilities would result in an inability to maintain maximum production levels.

Time horizon

Short-term

Likelihood

Unlikely

Magnitude of impact

Medium-high

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure – minimum (currency)

0

Potential financial impact figure – maximum (currency)

65,000,000

Explanation of financial impact figure

Of the 2.7 GW produced in 2018, our manufacturing facility in Perrysburg represented approximately 13%. Module sales in 2018 amounted to approximately $502 million. The maximum potential financial impact if our production in Ohio was down for a full year

would be approximately $65 million. We would likely lose some production for a while in the event of a natural disaster until we are able to bring the affected buildings back into production.

Management method

To mitigate the impacts of a natural disaster on our operations in Ohio, we separate our manufacturing capability across several buildings and created a separate production unit that creates a redundancy with our manufacturing process. We have implemented our management method to reduce this risk.

Cost of management

0

Comment

We own our manufacturing facility in Perrysburg so the cost of management is $0.

Identifier

Risk 4

Where in the value chain does the risk driver occur?

Supply chain

Risk type

Physical risk

Primary climate-related risk driver

Acute: Increased severity of extreme weather events such as cyclones and floods

Type of financial impact

Reduced revenue from decreased production capacity (e.g., transport difficulties, supply chain interruptions)

Company- specific description

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. Our asset-level (manufacturing plants) scorecards have identified natural disasters at a supplier's site as a key risk driver for their ability to disrupt supply and shipment channels at our manufacturing facility in Malaysia. Shortages of essential components could occur due to interruptions of supply and could impair our ability to meet customer demand for our products and interrupt our business. This would result in an inability to maintain maximum production levels.

Time horizon

Short-term

Likelihood

Likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure – minimum (currency)

0

Potential financial impact figure – maximum (currency)

412,000,000

Explanation of financial impact figure

Interruption of supply to our Malaysia manufacturing facility caused by physical climate drivers could significantly affect the company's production levels. Of the 2.7 GW produced in 2018, our manufacturing facility in Malaysia represented approximately 82%. Module sales in 2018 amounted to approximately $502 million. We would likely lose some production for a while in the event of a natural disaster interrupting our supply. Assuming our production in Malaysia was down for a full year, the maximum potential financial impact, would be approximately $412 million.

Management method

To mitigate risk impacts from interruptions to supply, we are developing secondary geographically located source suppliers and increasing our inventory by stocking critical materials onsite. We purchase critical raw materials used in our core production process in quantities that exceed anticipated consumption within our operating cycle (which is 12 months). We classify the raw materials that we do not expect to be consumed within our operating cycle as noncurrent. Our non-current inventory in 2018 amounted to more than $130 million (compared to $117 million in 2017). These costs are annual and ongoing.

Cost of management

130,000,000

Comment

C2.4

(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.4a

(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Opp1

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Shift in consumer preferences

Type of financial impact

Increased revenue through demand for lower emissions products and services

Company-specific description

The wholesale commercial and industrial market also represents a promising opportunity given our utility-scale PV solar power system expertise. The demand for corporate renewables is accelerating, with corporations worldwide committing to the RE100 campaign, a collaborative, global initiative of influential businesses committed to 100% renewable electricity. We believe we also have a competitive advantage in the commercial and industrial market due to many customers' sensitivity to the experience, bankability, and financial viability of their suppliers and geographically diverse operating locations. With our strong development expertise, financial strength, and global footprint, we are well positioned to meet their needs.

Time horizon

Current

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

731,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Of our 1.3GW DC of systems bookings in 2018, approximately 550MW DC of power purchase agreements (PPA) were signed with utilities, where corporate customers are the intended consumers of the energy to be generated by these projects. 2018 systems sales amounted to approximately $1.74 billion and corporate renewable energy procurement represented 42% (or approximately $731 million). Our 227 MWAC Muscle Shoals project and 58 MWAC Cove Mountain Solar 1 project are expected to provide energy for certain Facebook, Inc. data centers through PPAs with Tennessee Valley Authority and PacifiCorp, respectively. Since our first corporate related PPA with Apple Inc., we have contracted over 700 MWAC of PPAs associated with corporate customers to support their renewable energy goals. With companies worldwide increasingly committing to power their operations with 100% renewable energy, we expect demand from corporate customers will continue to be strong.

Strategy to realize opportunity

With our strong development experience, financial strength, and global footprint, we are well positioned to meet the needs of corporate customers. Our vertical integration combined with our partner collaboration enables us to identify and make system-level innovations, which creates further value for our customers. 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. In 2018, our total cost of systems sales amounted to approximately $1.3 billion. Assuming projects relating to corporate customers accounted for 42%, the cost to realize this opportunity is approximately $546 million.

Cost to realize opportunity

546,000,000

Comment

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.

Identifier

Opp2

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Development and/or expansion of low emission goods and services

Type of financial impact

Better competitive position to reflect shifting consumer preferences, resulting in increased revenues

Company-specific description

As a result of our specialized manufacturing process, the carbon footprint of our modules is up to six times lower than conventional crystalline silicon modules and a fraction of the carbon footprint of conventional energy sources. Our lower-carbon solar technology not only has positive environmental benefits, but also provides a competitive advantage in commercial discussions. Solar PV tenders in France require an official carbon footprint assessment of solar modules to be eligible for participating in government auctions. After module price, carbon footprint is the most important criteria.

Time horizon

Current

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure – minimum (currency)

0

Potential financial impact figure – maximum (currency)

502,000,000

Explanation of financial impact figure

During 2018, we sold the majority of our solar modules (not included in our systems projects) to integrators and operators of systems in the United States, Australia, and France, and such third-party module sales represented approximately 22% of our total net sales (or approximately $502 million).

Strategy to realize opportunity

We continue to pursue module sales activities in France which is running tenders where utility-scale PV solar projects can bid for capacity. One of our key points of differentiation is our sustainability advantage which further improves with our Series 6

technology. As a result of our specialized manufacturing process, the carbon footprint of our modules is up to six times lower than conventional crystalline silicon modules and a fraction of the carbon footprint of conventional energy sources. On a lifecycle basis, our thin film module technology inherently has the smallest carbon footprint, fastest energy payback time, and lowest water use of any PV solar technology on the market.

Cost to realize opportunity

0

Comment

Identifier

Opp3

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Shift in consumer preferences

Type of financial impact

Increased revenue through demand for lower emissions products and services

Company-specific description

The majority of states in the United States have enacted legislation adopting Renewable Portfolio Standard (“RPS”) mechanisms. Under a RPS, regulated utilities and other load serving entities are required to procure a specified percentage of their total retail electricity sales to end-user customers from eligible renewable resources, such as solar energy generation facilities, by a specified date. Measured in terms of the volume of renewable electricity required to meet its RPS mandate, California’s RPS program is the most significant in the United States, and the California market for renewable energy has dominated the western U.S. region for the past several years. The California RPS program requires utilities and other obligated load serving entities to procure 50% of their total retail electricity demand from eligible renewable resources by 2030.

Time horizon

Current

Likelihood

Virtually certain

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

852,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Currently, our solar projects in the United States represent the majority of the advanced-stage pipeline of projects that we are either currently constructing or expect to construct. In 2018, approximately 38% (or $852 million) of our total net sales ($2.24 billion) were derived from module and system sales in California.

Strategy to realize opportunity

We have significant experience and a market leadership position in developing, engineering, constructing, and maintaining utility-scale power plants in the United States, particularly in California and other southwestern states, and increasingly in southeastern states. Through our fully integrated systems business, 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. Our total cost of sales (modules and systems) in 2018 amounted to approximately $1.85 billion. Assuming California accounted for 38% of our net sales and thus 38% of our cost of sales, the estimated cost to realize this opportunity is approximately $703 million.

Cost to realize opportunity

703,000,000

Comment

Identifier

Opp4

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Markets

Primary climate-related opportunity driver

Access to new markets

Type of financial impact

Increased revenues through access to new and emerging markets (e.g., partnerships with governments, development banks)

Company-specific description

As part of our long-term strategic plans, we are focused 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. India continues to represent one of the largest and fastest growing markets for PV solar energy with an installed generation capacity of nearly 25 GW DC, another 12 GW DC of projects in development or construction, and over 20 GW DC of new procurement programs announced. In addition, the government has established aggressive renewable energy targets, which include increasing the country's solar capacity to 100 GW DC by 2022. These targets, along with various policy and regulatory measures, help create significant and sustained demand for PV solar energy. Accordingly, we expect to continue selling modules to local integrators and operators of systems to address the region's energy needs. In March 2018, we completed the sale of our Winsol and Hindupur projects located in Andhra Pradesh, which total 155 MW AC. We also own and operate two additional projects located in Karnataka, totaling 40 MW AC, for which we have secured rights to sell power under separate 25-year PPAs to state owned electricity distribution companies. In addition, we continue to maintain our strong module presence in the region with approximately 2 GW DC of installed modules.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

232,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

India continues to represent one of the largest and fastest growing markets for PV solar energy. In 2018, India represented our third largest market and accounted for 232 million or approximately 10% of our net sales ($2.24 billion in 2018).

Strategy to realize opportunity

We have established and are continuing to develop a global business presence. Assuming India also accounted for 10% of our total cost of sales ($1.85 billion in 2018), the estimated cost to realize this opportunity is approximately $185 million.

Cost to realize opportunity

185,000,000

Comment

C2.5

(C2.5) Describe where and how the identified risks and opportunities have impacted your business.

	Impact	Description
Products and services	Impacted	Solar energy is one of the fastest growing forms of renewable energy with numerous economic and environmental benefits that make it an attractive complement to and/or substitute for traditional forms of energy generation. The cumulative global installed base of PV has grown tenfold over the past 7 years, to more than 500GW in 2018. Following record 2017 net bookings of 7.7GW, commercial growth continued to be strong in 2018, with 5.6GW of new business contracted. Of the 1.3GW DC of systems bookings, approximately 550MW DC of power purchase agreements (PPA) were signed with utilities, where corporate customers are the intended consumers of the energy to be generated by these projects. With companies worldwide increasingly committing to power their operations with 100 percent renewable energy, we expect demand from corporate customers will continue to be strong.
Supply chain and/or value chain	Not yet impacted	Interruption of supply to our manufacturing facilities caused by physical climate drivers has not yet occurred but could significantly affect the company's production levels, particularly in Malaysia. Of the 2.7 GW produced in 2018, our Malaysian manufacturing facility represented approximately 82%. Module sales in 2018 amounted to approximately $502 million. Assuming 82% of our 2018 module manufacturing capacity was impacted, the potential financial impact would be approximately $412 million. Since natural disasters and extreme weather events are becoming increasingly frequent, the potential timescale for such an impact is short-term (1-3 years). Our supply chain has also not yet been impacted by rising energy prices associated with a carbon tax or similar climate change regulations. However we estimate the impact on our purchased goods and services would be relatively low. Assuming a carbon price of $39/ metric ton applied to our 2018 scope 3 emissions for purchased goods and services (388,421 metric tons CO2-eq), the

		cost of our purchased goods and services could increase by approximately $15 million (up 25% compared to 2017). Since a carbon tax is about as likely as not, the potential/predicted timescale for this impact is long-term (>5 years)
Adaptation and mitigation activities	Impacted	To reduce grid electricity consumption and mitigate risks associated with increasing electricity costs, First Solar is implementing energy efficiency initiatives and installing onsite PV installations as part of our standard manufacturing system design at our production sites in Ohio and Malaysia and at our recycling facility in Frankfurt Oder, Germany. Over the past four years, we invested approximately $6.7 million into energy efficiency and onsite PV installations at our manufacturing facilities in Ohio and Malaysia. By reducing our consumption of grid electricity, these projects helped us save over $10 million since 2014.
Investment in R&D	Impacted	In 2018, we spent more than $84 million on our research and development efforts, which generally focus on continually improving the conversion efficiency and energy yield of our solar modules and lowering the levelized cost of electricity of our PV solar power systems. As a result, our integrated power plant solutions deliver an economically attractive alternative to fossil-fuel electricity generation today. We believe we are among the lowest cost PV 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.
Operations	Not yet impacted	Our manufacturing operations have not yet been significantly impacted by a natural disaster. We would likely lose some production for a while in the event of a natural disaster until we are able to bring the affected buildings back into production. Since natural disasters and extreme weather events are becoming increasingly frequent, the potential timescale for such an impact is short-term (1-3 years).
Other, please specify	Not impacted	No other areas of the business have been impacted by the identified risks and opportunities.

C2.6

(C2.6) Describe where and how the identified risks and opportunities have been factored into your financial planning process.

	Relevance	Description
Revenues	Impacted	100% of our revenues come from providing PV solar solutions to climate change. In 2018, our net sales amounted to $2.2 billion.
Operating costs	Impacted	In terms of operating expenses relating to climate change risks and opportunities, we invest in research and development to continually improve the conversion efficiency and energy yield of our solar

		modules and lower the levelized cost of electricity of our PV solar power systems so they can compete with fossil fuel technologies. In 2018, we invested approximately $84 million on research and development. We also spent more than $177 million in 2018 on global 'selling, general and administrative' expenses which consist primarily of salaries and other personnel-related costs, professional fees, insurance costs, travel expenses, and other business development and selling expenses related to the increasing demand for renewable energy products.
Capital expenditures / capital allocation	Impacted	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, enabling us to capitalize on the increasing demand for renewable energy products. Other relevant climate change mitigation capital expenditures include energy efficiency and low carbon installations (solar) at our manufacturing and recycling sites to reduce electricity consumption.
Acquisitions and divestments	Not impacted	We had no acquisitions or divestments in 2018 that were impacted by climate change risks or opportunities.
Access to capital	Not impacted	Our module business is not impacted as this is financed with cash on the balance. Our systems business is also not impacted as access to capital is more a function of liquidity in the market versus demand for renewable energy.
Assets	Not yet impacted	Our manufacturing assets have not yet been significantly impacted by extreme weather events and natural disasters. Since natural disasters and extreme weather events are becoming increasingly frequent, the potential timescale for such an impact is short-term (1-3 years).
Liabilities	Not impacted	Liabilities were not impacted by climate-related risks and opportunities.
Other	Not impacted	No other financial planning aspects are impacted by climate-related risks and opportunities.

C3. Business Strategy

C3.1

(C3.1) Are climate-related issues integrated into your business strategy?

Yes

C3.1a

(C3.1a) Does your organization use climate-related scenario analysis to inform your business strategy?

Yes, quantitative

C3.1c

(C3.1c) Explain how climate-related issues are integrated into your business objectives and strategy.

In setting the company's vision and mission and supporting climate action with the Climate Leadership Council’s carbon dividend proposal, First Solar has integrated climate-related issues into the company’s business objectives and strategies. First Solar's long-term vision is 'to lead the world's sustainable energy future'. Our mission, 'to provide cost-advantaged solar technology through innovation, customer engagement, industry leadership and operational excellence,' describes how we strive towards our vision in the short-term. With the combination of strong industry growth and our points of differentiation, we believe that we can turn our vision into reality and achieve attractive returns for our shareholders while helping meet global energy and electricity demand in a sustainable way.

One of our key points of differentiation is our sustainability advantage. In addition to providing a cost and performance advantage, our thin film photovoltaic (PV) technology boasts the smallest carbon footprint, lowest water use and fastest energy payback time in the industry. Our lower-carbon solar technology not only has positive environmental benefits, but it also provides a competitive advantage in commercial discussions. As a result of our technology's competitive offering and low carbon footprint, we were awarded more than 100 megawatts (MW) of module supply agreements in France in 2017. In 2018, the majority of our solar modules were sold to integrators and operators of systems in the United
States, Australia, and France.

Our most substantial business decision, to transition to our next generation Series 6 PV technology, was influenced by the need for low-cost clean energy products. 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. We produced 2.7 GW DC of solar modules in 2018, which represented an 18% increase from 2017. In addition, our sustainability advantage is set to increase with our Series 6 technology due to its larger form factor, higher anticipated efficiency of 17.5 percent and lower glass usage per m2. By transitioning to our larger, more efficient and still recyclable Series 6 modules, the

environmental footprint of our thin film PV technology is expected to be four times lower than the average PV module. (Sinha and Wade, Addressing Hotspots in the Product Environmental Footprint of CdTe Photovoltaics, IEEE PVSC, 2017.)

The Paris Agreement has influenced our business strategy in terms of creating opportunities and generating demand for our PV energy solutions. Policy makers, investors and the public increasingly recognize solar as a sustainable response to the environmental cost of hydrocarbon-fueled power generation. In addition, the Paris Agreement led to an increasing demand for corporate renewables, with companies worldwide committing to procuring 100% renewable electricity. The wholesale commercial and industrial market is a promising opportunity for First Solar given our large-scale PV system expertise. Our lower carbon and water footprint and faster energy payback time provides an ecologically leading solution to climate change, water scarcity and energy security, which also enables our customers to achieve their sustainability goals. The largest of our 2018 systems bookings was a 227MW AC PPA contracted with the Tennessee Valley Authority to construct a solar project that will supply power to a Facebook data center in Alabama. This and the other PPAs signed are examples of how differentiated capabilities allow us to address the renewable energy goals of corporate buyers in partnership with utilities, by leveraging efficient and reliable large-scale offsite generation facilities. With companies worldwide increasingly committing to power their operations with
100 percent renewable energy, we expect demand from corporate customers will continue to be strong.

In addition to manufacturing PV modules with the lowest environmental impact in the industry, First Solar is committed to reducing the company's own operational impact. Since 2009, we've successfully reduced our energy, water, waste, and carbon intensity per watt produced through improvements in module efficiency, manufacturing throughput and capacity utilization, as well as by implementing resource conservation projects at our facilities. In 2016, we set a five-year goal to reduce our greenhouse (GHG) emissions intensity per watt produced by 45 percent compared to our 2008 baseline. In 2018, we surpassed our 2021 goal to reduce our GHG emissions intensity per watt produced by 45 percent. Although our production increased by 18% in 2018, our absolute greenhouse gas emissions only increased by 9%. While we have already achieved our new five-year goal for 2021, we are continuing our retooling and ramping activities. As such, maintaining our progress through 2021 will be an important achievement. Since 2008, we have nearly halved our company-wide carbon intensity through increased module efficiency, manufacturing throughput, and capacity utilization, decreased emissions intensity of purchased grid electricity, and energy conservation and low carbon initiatives.

As part of our commitment to responsible life cycle management, First Solar also developed the industry's first global module recycling program to recycle manufacturing scrap and end-of-life modules. Recycling ensures the solutions to climate change today do not pose a waste management burden on future generations and enables us to recycle semiconductor material for reuse in new solar modules, glass for new glass products, and laminate material for new rubber products such as mats and bicycle handles. By avoiding the landfilling of manufacturing waste, GHG emissions associated with landfill disposal are avoided.

C3.1d

(C3.1d) Provide details of your organization's use of climate-related scenario analysis.

Climate-related scenarios	Details
2DS RCP 2.6	We used forward-looking scenario analyses such as the 2°C scenario, when considering the company's new greenhouse gas emissions target. However, due to our transition to Series 6 module manufacturing and the new machinery and equipment's expected impact on our energy usage and emissions intensity, we are unable to set science-based targets at this time. In assessing the feasibility of science-based targets, we used the CSO Carbon Metric with RCP2.6 - a 2°C GHG mitigation scenario developed under IPCC. Inputs include historical Scope 1 and 2 GHG emissions, gross margins, and total units of production. The scenario was considered over a medium term time horizon of 5 years, consistent with our business planning horizon. However the CSO Carbon Metric method provides forecasts through 2050. Areas of the organization considered as part of the scenario analysis include Scope 1 and 2 emissions sources (manufacturing and R&D facilities, owned and operational PV projects, owned EPC equipment, vehicle fleet, purchased electricity). The results of the scenario analysis determined that a science-based target would involve reducing corporate Scope 1 and 2 CO2-emissions intensity by 80% (from 246 to 47 MT CO2 eq per MW) from a 2008 baseline. Achieving this goal would require implementing a strategy of increasing module efficiency, reducing energy consumption and procuring offsite solar electricity.

C4. Targets and performance

C4.1

(C4.1) Did you have an emissions target that was active in the reporting year?

Intensity target

C4.1b

(C4.1b) Provide details of your emissions intensity target(s) and progress made against those target(s).

Target reference number

Int 1

Scope

Scope 1 +2 (market-based)

% emissions in Scope

100

Targeted % reduction from base year

45

Metric

Other, please specify

Metric Tons CO2e per megawatt (MW) produced

Metric Tons CO2e per megawatt (MW) of solar panels produced

Base year

2008

Start year

2011

Normalized base year emissions covered by target (metric tons CO2e)

246

Target year

2021

Is this a science-based target?

No, but we anticipate setting one in the next 2 years

% of target achieved

100

Target status

Achieved

Please explain

After successfully achieving the company's first GHG emissions intensity reduction target. First Solar set a new five-year goal for 2021 to reduce our greenhouse gas emissions intensity per watt produced by 45 percent compared to our 2008 baseline. We evaluated the possibility of setting science-based targets but are not currently able to implement them at this stage. Due to our transition to Series 6 module manufacturing and related re-tooling and replacement of machinery and production equipment, uncertainties related to energy consumption during commissioning, ramp-up and achieving steady-state manufacturing operations with projected module conversion efficiencies, we are unable to set science-based targets at this time. However, we remain committed to evaluating and striving towards science-based targets. While we have already achieved our new five-year goal for 2021, we are continuing our retooling and ramping activities, such that maintaining our progress through 2021 will be an important achievement.

% change anticipated in absolute Scope 1+2 emissions

652

% change anticipated in absolute Scope 3 emissions

C4.2

(C4.2) Provide details of other key climate-related targets not already reported in question C4.1/a/b.

C4.3

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

C4.3a

(C4.3a) Identify the total number of initiatives at each stage of development, and for those in the implementation stages, the estimated CO2e savings.

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	0	0
To be implemented*	0	0
Implementation commenced*	0	0
Implemented*	2	70
Not to be implemented	0	0

C4.3b

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

Initiative type

Energy efficiency: Building services

Description of initiative

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

64

Scope

Scope 2 (market-based)

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
11,130

Investment required (unit currency – as specified in C0.4)
2,356

Payback period
<1 year

Estimated lifetime of the initiative
3-5 years

Comment
First of two relighting projects in Kulim, Malaysia manufacturing facility.

Initiative type
Energy efficiency: Building services

Description of initiative
Lighting

Estimated annual CO2e savings (metric tonnes CO2e)
6

Scope
Scope 2 (market-based)

Voluntary/Mandatory
Voluntary

Annual monetary savings (unit currency – as specified in C0.4)
1,128

Investment required (unit currency – as specified in C0.4)
250

Payback period
<1 year

Estimated lifetime of the initiative
3-5 years

Comment
Second of two relighting projects in Kulim, Malaysia manufacturing facility.

C4.3c

(C4.3c) What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Dedicated budget for low-carbon product R&D	Our product causes the greatest impact on GHG reduction. We have a dedicated Research and Development function whose sole purpose is to enhance the efficiency of our product and lower the cost of making it. These projects get a significant amount of First Solar's overall R&D spending.
Employee engagement	We have engaged employees at the site and global level. We have a global facilities team working on defining priorities, identifying opportunities, and implementing energy conservation projects. This is also done at the site level in our manufacturing and research locations, where we have dedicated local teams. Our facilities teams are also rewarded for achieving our energy savings targets.
Financial optimization calculations	Each project opportunity is evaluated for its payback, and external incentives are considered when calculating payback. Energy saving targets are established to reduce manufacturing costs.
Lower return on investment (ROI) specification	Although we do not have a specific ROI for energy conservation projects, we recognize that energy projects are low risk and this understanding of risk is integrated into our regular capital planning decisions.
Partnering with governments on technology development	We have worked with local utilities to find and implement energy conservation projects. For example, we worked with Silicon Valley Power to identify opportunities to reduce our GHG emissions, energy consumption and energy costs at our Santa Clara office building.

C4.5

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products or do they enable a third party to avoid GHG emissions?

Yes

C4.5a

(C4.5a) Provide details of your products and/or services that you classify as low-carbon products or that enable a third party to avoid GHG emissions.

Level of aggregation

Company-wide

Description of product/Group of products

In addition to manufacturing PV solar modules that generate clean reliable electricity with no air emissions, waste production, and minimal water use, First Solar constructs

PV projects that displace the use of electricity generated by fossil fuels, and provides operations and maintenance products and services to enhance grid stability. Our solar PV solutions are helping displace approximately 5 times the emissions we emit through our global operations. In 2018, First Solar produced 2.7 GW of PV solar modules and our company-wide scope 1 and scope 2 greenhouse gas emissions amounted to approximately 0.35 million metric tons of CO2 equivalent. Assuming worldwide average irradiance and grid electricity emissions, we conservatively estimate that our 2018 products are being used to displace 1.9 million metric tons CO2e per year for the 25+ year product life. Since First Solar began commercial operations in 2002 and through 2018, we have sold over 20 GW of PV solar modules. Assuming average worldwide irradiance and grid electricity emissions, our products are being used to displace 14 million metric tons of CO2e per year for their 25+ year product life. This is equivalent to powering 10 million average homes and saving over 36 billion liters of water (~14,000 Olympic swimming pools) per year based on worldwide averages.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product and avoided emissions

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify

Worldwide average carbon displacement

% revenue from low carbon product(s) in the reporting year

100

Comment

First Solar's eco-efficient PV modules and power plants are displacing more than thirty times the amount of greenhouse gas emissions we emit through our global operations. In 2018, First Solar's company-wide scope 1 and scope 2 greenhouse gas emissions amounted to approximately 0.35 million metric tons of CO2 equivalent. With over 20GW of modules sold worldwide, First Solar PV solutions are displacing 14 million metric tons of CO2 equivalent per year, resulting in a net beneficial carbon impact of over 13 million metrics tons CO2e per year, assuming average worldwide irradiance and grid electricity emissions. More information on the worldwide average solar carbon displacement methodology is provided in our technical report: P. Sinha and L. Jenkins, 2011, Estimating Carbon Displacement by Solar Deployment, First Solar Technical Report. (Available at: http://www.firstsolar.com/-/media/First-Solar/Sustainability-Documents/Sustainability-Studies/TechnicalReportCarbonDisplacement_02761_NA.ashx?dl=1)

C5. Emissions methodology

C5.1

(C5.1) Provide your base year and base year emissions (Scopes 1 and 2).

Scope 1

Base year start

January 1, 2008

Base year end

December 31, 2008

Base year emissions (metric tons CO2e)

1,020

Comment

Scope 2 (location-based)

Base year start

January 1, 2008

Base year end

December 31, 2008

Base year emissions (metric tons CO2e)

123,046

Comment

Scope 2 (market-based)

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

C5.2

(C5.2) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions.

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

C6. Emissions data

C6.1

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO2e?

Reporting year

Gross global Scope 1 emissions (metric tons CO2e)

22,200

Start date

January 1, 2018

End date

December 31, 2018

Comment

C6.2

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.

Row 1

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We are reporting a Scope 2, market-based figure

Comment

C6.3

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO2e?

Reporting year

Scope 2, location-based

427,890

Scope 2, market-based (if applicable)

334,088

Start date

January 1, 2018

End date

December 31, 2018

Comment

In 2018, First Solar purchased grid electricity for its Kulim, Malaysia facility with a supplier-specific emissions factor of 0.534 metric tons CO2e/MWh. The national grid average emissions factor for Malaysia is 0.671 metric tons CO2e/MWh. First Solar purchased grid electricity for its Perrysburg, Ohio, USA facility with a supplier-specific emissions factor of 0.430 metric tons CO2e/MWh. The USEPA eGRID regional grid average emissions factor (RFC West region) is 0.685 metric tons CO2e/MWh.

C6.4

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

No

C6.5

(C6.5) Account for your organization's Scope 3 emissions, disclosing and explaining any exclusions.

Purchased goods and services

Evaluation status

Relevant, calculated

Metric tonnes CO2e

388,421

Emissions calculation methodology

Based on life cycle assessment of First Solar PV module production (Table III; DOI: 10.1002/pip.1068) and total modules produced in 2018, and subtracting 2018 Scope 1 and 2 emissions

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Explanation

Bill of materials for PV module manufacturing from a previous year were the basis for the life cycle assessment combined with modules produced in 2018.

Capital goods

Evaluation status

Relevant, calculated

Metric tonnes CO2e

524,426

Emissions calculation methodology

Our capital expenditures are disclosed as 'purchases of property, plant, and equipment' in our annual report's consolidated cash flow statement. In alignment with the WRI/WBCSD GHG Protocol, we used the Quantis Scope 3 Evaluator tool to calculate scope 3 emissions associated with capital goods purchased based on spend. The emissions are calculated by multiplying our 2018 capital goods spend by a CO2 emission factor based on the broad sector of purchase.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Explanation

Capital expenditures on purchases of property, plant, and equipment were the basis for the estimate.

Fuel-and-energy-related activities (not included in Scope 1 or 2)

Evaluation status

Relevant, calculated

Metric tonnes CO2e

16,704

Emissions calculation methodology

GHG emissions from transmission and distribution losses were estimated from market-based Scope 2 GHG emissions from purchased electricity (presented earlier) in conjunction with a transmission and distribution loss factor of 5%.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Explanation

Quantities of purchased electricity were the basis for the estimate.

Upstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO2e

5,055

Emissions calculation methodology

Glass supply distances to First Solar's largest manufacturing facility (Kulim, Malaysia; Table S1 of DOI:10.1109/JPHOTOV.2018.2802786) used in conjunction with transoceanic freight ship fuel consumption factor of 0.0025 kg heavy fuel oil per tonne-km and a residual fuel oil emission factor from WRI GHG Protocol stationary combustion tool (V. 4.1).

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Explanation

GHG Emissions were extrapolated from glass supply distances and transport methods from a previous year combined with data on modules produced in 2018.

Waste generated in operations

Evaluation status

Relevant, calculated

Metric tonnes CO2e

3,516

Emissions calculation methodology

In 2018, we disposed of 7.25 million kilograms of waste (or 7,992 Tons). Quantity of disposed waste from manufacturing facilities was used in conjunction with U.S. EPA mixed waste landfilling emission factor of 0.12 Metric Ton Carbon Equivalent /Ton. The mass conversion factor of mass carbon to mass CO2 generated during combustion processes is 44/12

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Explanation

Quantities of disposed non-hazardous and hazardous waste were the basis for the estimate. In 2018, we disposed of 7.25 million kilograms of waste (or 7,992 Tons). Note that approximately 15.74 million kilograms of waste (or 68% of the 22.99 million kilograms of total waste generated) were recycled in 2018.

Business travel

Evaluation status

Relevant, calculated

Metric tonnes CO2e

5,395

Emissions calculation methodology

Short, medium, and long haul passenger air miles recorded by corporate travel agent were used in conjunction with air travel emission factors of 0.53, 0.43, and 0.39 lb CO2 per passenger mile, respectively.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Explanation

Short, medium, and long haul passenger air miles recorded by corporate travel agent were the basis for the estimate.

Employee commuting

Evaluation status

Relevant, calculated

Metric tonnes CO2e

12,750

Emissions calculation methodology

Number of full-time equivalent employees in 2018 was the basis for this estimate combined with assumptions regarding average employee commuting GHG emissions from the Quantis Scope 3 evaluator tool.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Explanation

Number of full-time equivalent employees in 2018 was the basis for this estimate.

Upstream leased assets

Evaluation status

Relevant, calculated

Metric tonnes CO2e

2,793

Emissions calculation methodology

Leased vehicle fuel usage was used in conjunction with WRI Transport Tool, V. 2.5 and and IPCC Fourth Assessment Report GWP values.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Explanation

Leased vehicle fuel usage was basis for the estimate.

Downstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO2e

35,429

Emissions calculation methodology

Finished product (PV module) transport distances and transport methods (ship) from our largest manufacturing facility (Kulim, Malaysia) to our largest market (U.S.; Long Beach, CA used as representative port) were used in conjunction with a transoceanic freight ship fuel consumption factor of 0.0025 kg heavy fuel oil per tonne-km and a residual fuel oil emission factor from WRI GHG Protocol stationary combustion tool (V. 4.1).

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Explanation

GHG Emissions were estimated from quantity of PV modules produced in 2018 in conjunction with port to port distance.

Processing of sold products

Evaluation status

Not relevant, explanation provided

Explanation

Our products are not further processed. In less than 3.5 hours, First Solar's fully integrated manufacturing process transforms a sheet of glass into a completed thin film solar PV module, which is flash tested, boxed, and ready for shipment. All processes from the beginning of our manufacturing process to completed module are covered in our scope 1 and 2 emissions

Use of sold products

Evaluation status

Relevant, calculated

Metric tonnes CO2e

0

Emissions calculation methodology

Our products (PV modules) are energy producing rather than energy consuming products.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Explanation

Our products are classified as zero-emission electricity generation technologies. First Solar PV solar modules generate clean reliable electricity with no air emissions, waste production, and minimal water use. In 2018, First Solar produced 2.7 GWdc of PV solar modules. Assuming world-wide average irradiance and grid electricity emissions, we estimate that our 2018 products are being used to displace 1.9 million metric tons CO2e per year for the 25+ year product life.

End of life treatment of sold products

Evaluation status

Relevant, calculated

Metric tonnes CO2e

681

Emissions calculation methodology

Electricity consumption per square meter of PV module recycled (DOI: 10.4229/27thEUPVSEC2012-6CV.4.9) was used in conjunction with quantities of end of life PV modules recycled at First Solar's recycling facilities in U.S., Germany, and Malaysia and market-specific GHG electricity emission factors.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Explanation

GHG emissions were estimated from quantity of end of life PV modules recycled in 2017 in conjunction with an electricity consumption factor from a previous year. First Solar, as part of its commitment to extended producer responsibility, has voluntarily established and implemented the industry's first global module recycling program. Note that since these recycling facilities are owned and operated by First Solar, their greenhouse gas emissions are already accounted for within Scope 1 and 2.

Downstream leased assets

Evaluation status

Relevant, calculated

Metric tonnes CO2e

463

Emissions calculation methodology

Electricity consumption per square foot for warehouse facilities from EIA CBECS database was used in conjunction with square footage from leased warehouse facilities and WRI GHG Protocol tool for purchased electricity (V. 4.7).

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Explanation

GHG emissions were estimated based on square footage of leased warehouse facilities.

Franchises

Evaluation status

Not relevant, explanation provided

Explanation

We do not have franchises therefore this is not relevant and there are no scope 3 emissions to report.

Investments

Evaluation status

Relevant, calculated

Metric tonnes CO2e

17,677

Emissions calculation methodology

GHG Emissions from projects in the construction phase were estimated from First Solar Topaz Solar Farm Environmental Impact Report, Appendix 8A, Table 4-10 (which uses URBEMIS vehicle emission factors and IPCC Second Assessment Report GWP values), scaled to 2017 EPC solar deployment of 1696MW (dc).

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Explanation

GHG Emissions were extrapolated from First Solar Topaz Solar Farm Environmental Impact Report based on 2018 EPC solar deployment data.

Other (upstream)

Evaluation status

Not relevant, explanation provided

Explanation

There are no other relevant Scope 3 GHG emissions from upstream sources

Other (downstream)

Evaluation status

Not relevant, explanation provided

Explanation

There are no other relevant Scope 3 GHG emissions from downstream sources

C6.7

(C6.7) Are carbon dioxide emissions from biologically sequestered carbon relevant to your organization?

No

C6.10

(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO2e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.

Intensity figure

0.000159

Metric numerator (Gross global combined Scope 1 and 2 emissions)

356,288

Metric denominator

unit total revenue

Metric denominator: Unit total

2,244,044,000

Scope 2 figure used

Market-based

% change from previous year

43

Direction of change

Increased

Reason for change

In 2018, our absolute Scope 1 and 2 GHG emissions (356,288 MT CO2e) increased by 9% relative to 2017 (325,518 MT CO2e) due to increased production volumes. Total revenue decreased by 24% in 2018 ($2.24 billion) compared to 2017($2.94 billion). 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.

Intensity figure

55

Metric numerator (Gross global combined Scope 1 and 2 emissions)

356,288

Metric denominator

full time equivalent (FTE) employee

Metric denominator: Unit total

6,433

Scope 2 figure used

Market-based

% change from previous year

30

Direction of change

Decreased

Reason for change

In 2018, our absolute Scope 1 and 2 GHG emissions (356,288 MT CO2e) increased by 9% relative to 2017 (325,518 MT CO2e) due to increased production volumes. FTE increased by a greater percentage (56%) from 4,130 in 2017 to 6,433 in 2018 due in part to the commencement of operations in our manufacturing facility in Ho Chi Minh City, Vietnam.

Intensity figure

132

Metric numerator (Gross global combined Scope 1 and 2 emissions)

356,288

Metric denominator

Other, please specify

MW of PV modules produced

Metric denominator: Unit total

2,706

Scope 2 figure used

Market-based

% change from previous year

8

Direction of change

Decreased

Reason for change

In 2018, our absolute Scope 1 and 2 GHG emissions (356,288 MT CO2e) increased by 9% relative to 2017 (325,518 MT CO2e) due to increased production volumes, though not directly proportional to production volume which increased 18% from 2284 MW in 2017 to 2706 MW in 2018.

C7. Emissions breakdowns

C7.1

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

C7.1a

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

Greenhouse gas	Scope 1 emissions (metric tons of CO2e)	GWP Reference
CO2	18,293	IPCC Fifth Assessment Report (AR5 – 100 year)
CH4	17	IPCC Fifth Assessment Report (AR5 – 100 year)
N2O	59	IPCC Fifth Assessment Report (AR5 – 100 year)
HFCs	3,829	IPCC Fourth Assessment Report (AR4 - 100 year)

C7.2

(C7.2) Break down your total gross global Scope 1 emissions by country/region.

Country/Region	Scope 1 emissions (metric tons CO2e)
Germany	494
Malaysia	3,081
United States of America	17,724
Japan	0
Australia	0
Samoa	0
Chile	0
India	0

Viet Nam	901

C7.3

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

By business division
By facility
By activity

C7.3a

(C7.3a) Break down your total gross global Scope 1 emissions by business division.

Business division	Scope 1 emissions (metric ton CO2e)
Manufacturing and Recycling	6,962
Research and Development	187
Engineering, Procurement, and Construction	8,201
Vehicle Fleet	6,850

C7.3b

(C7.3b) Break down your total gross global Scope 1 emissions by business facility.

Facility	Scope 1 emissions (metric tons CO2e)	Latitude	Longitude
Perrysburg, Ohio, USA	2,486	41.557058	-83.552515
Frankfurt-Oder, Germany	494	52.312919	14.481102
Kulim, Malaysia	3,081	5.428624	100.572598
Santa Clara, California, USA	187	37.371053	-121.951931
Engineering, Procurement, and Construction	8,201	39.766959	-86.164956
Vehicle Fleet	6,850	39.766959	-86.164956
Ho Chi Minh City, Viet Nam	901	10.77653	106.70098

C7.3c

(C7.3c) Break down your total gross global Scope 1 emissions by business activity.

Activity	Scope 1 emissions (metric tons CO2e)
Stationary Combustion	11,352
Mobile Source Emissions	6,786
Fugitive Emissions	3,829

Process Emissions	233

C7.5

(C7.5) Break down your total gross global Scope 2 emissions by country/region.

Country/Region	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted in market-based approach (MWh)
Australia	3	3	4	0
Chile	1,073	1,073	2,221	0
Germany	989	989	2,081	0
India	1,053	1,053	1,137	0
Japan	9	9	16	
Malaysia	312,680	248,705	465,739	0
Samoa	19	19	60	0
United States of America	84,139	54,312	126,824	0
Viet Nam	27,925	27,925	79,509	0

C7.6

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

By business division
By facility
By activity

C7.6a

(C7.6a) Break down your total gross global Scope 2 emissions by business division.

Business division	Scope 2, location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Manufacturing and Recycling	422,705	328,903
Research and Development	2,223	2,223
Owned Operational Solar Projects	2,962	2,962

C7.6b

(C7.6b) Break down your total gross global Scope 2 emissions by business facility.

Facility	Scope 2 location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Perrysburg, Ohio, USA	81,111	51,284
Frankfurt-Oder, Germany	989	989
Kulim, Malaysia	312,680	248,705
Santa Clara, California, USA	1,429	1,429
Mesa, Arizona, USA	794	794
Owned Operational Solar Projects	2,962	2,962
Ho Chi Minh City, Viet Nam	27,925	27,925

C7.6c

(C7.6c) Break down your total gross global Scope 2 emissions by business activity.

Activity	Scope 2, location-based emissions (metric tons CO2e)	Scope 2, market-based emissions (metric tons CO2e)
Purchased Electricity	427,890	334,088

C7.9

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Increased

C7.9a

(C7.9a) Identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined) and for each of them specify how your emissions compare to the previous year.

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
Change in renewable	0	No change	0	First Solar's on-site PV installations at its manufacturing and recycling facilities in

energy consumption				Kulim, Malaysia (750 kW), Frankfurt-Oder, Germany (2.9 MW), and Perrysburg, Ohio, USA (2.75 MW) continue to generate about 7 GWh/yr of electricity for self-consumption.
Other emissions reduction activities	70	Decreased	0.02	First Solar implemented re-lighting projects at its manufacturing facility in Kulim, Malaysia. These measures resulted in savings of 70 metric tons CO2e from avoided electricity consumption in 2017. Our scope 1 and 2 emissions in the previous year (2017) amounted to 309357 metric tons CO2e. We arrived at a 0.02% decrease in our gross global emissions through (70/ 309357) *100 = 0.02%
Divestment	0		0	There were no divestments in 2018.
Acquisitions	0		0	There were no acquisitions in 2018.
Mergers	0		0	There were no mergers in 2018.
Change in output	60,144	Increased	18.5	From 2017 to 2018, First Solar increased its production of PV solar modules by 18% from 2.28GW to 2.71GW. This increased output corresponds to a increase of 106,649 metric tons CO2e of emissions, or 18.5% of the previous year's emissions through (60144 / 325518)*100 = 18.5%.
Change in methodology	44,331	Decreased	13.6	In 2018, First Solar changed the grid electricity emission factor for its Kulim, Malaysia facility from a supplier specific factor of 0.630 kg CO2e/kWh in 2017 to a supplier-specific factor of 0.534 kg CO2e/kWh in 2018. Use of the updated supplier specific factor resulted in an decrease of 44,711 metric tons CO2e of emissions compared with using the 2017 factor. Also In 2018, First Solar changed the grid electricity emission factor for its Perrysburg, Ohio facility to include CH4 and N2O emissions, resulting in an increase of 380 metric tons CO2e compared with the 2017 methodology. The updated emissions factors for the two

				facilities account for or 10.9% of the previous year's emissions through (-44,711+380) / 325,518)*100 = -13.6%
Change in boundary	0		0	There were no changes in boundary in 2017.
Change in physical operating conditions	0		0	There no changes in physical operating conditions in 2017.
Unidentified	0		0	There were no unidentified changes in 2017
Other	14,974	Increased	4.6	In 2018, higher under-utilization associated with the initial ramp of Series 6 manufacturing lines resulted in an increase of 14,974 metric tons CO2e of emissions, or 4.6% of the previous year's emissions through (14,974/325,518)*100=4.6%

C7.9b

(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Market-based

C8. Energy

C8.1

(C8.1) What percentage of your total operational spend in the reporting year was on energy?

More than 0% but less than or equal to 5%

C8.2

(C8.2) Select which energy-related activities your organization has undertaken.

	Indicate whether your organization undertakes this energy-related activity
Consumption of fuel (excluding feedstocks)	Yes

Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	No
Consumption of purchased or acquired steam	No
Consumption of purchased or acquired cooling	No
Generation of electricity, heat, steam, or cooling	Yes

C8.2a

(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total MWh
Consumption of fuel (excluding feedstock)	HHV (higher heating value)	0	76,812	76,812
Consumption of purchased or acquired electricity		0	677,591	677,591
Consumption of self-generated non-fuel renewable energy		7,172		7,172
Total energy consumption		7,172	754,403	761,575

C8.2b

(C8.2b) Select the applications of your organization's consumption of fuel.

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	Yes
Consumption of fuel for the generation of heat	No
Consumption of fuel for the generation of steam	No
Consumption of fuel for the generation of cooling	No

Consumption of fuel for co-generation or tri-generation	No

C8.2c

(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.

Fuels (excluding feedstocks)

Natural Gas

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

15,437

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

15,437

Comment

Fuels (excluding feedstocks)

Motor Gasoline

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

28,931

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

28,931

Comment

Fuels (excluding feedstocks)

Diesel

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

32,444

MWh fuel consumed for self-generation of electricity

190

MWh fuel consumed for self-generation of heat

32,253

Comment

C8.2d

(C8.2d) List the average emission factors of the fuels reported in C8.2c.

Diesel

Emission factor

2.685

Unit

kg CO2e per liter

Emission factor source

GHG Protocol tool for stationary combustion. Version 4.1

Comment

Motor Gasoline

Emission factor

8.941

Unit

kg CO2e per gallon

Emission factor source

GHG Protocol tool for mobile combustion. Version 2.2

Comment

Natural Gas

Emission factor

1.887

Unit

kg CO2e per m3

Emission factor source

GHG Protocol tool for stationary combustion. Version 4.1

Comment

C8.2e

(C8.2e) Provide details on the electricity, heat, steam, and cooling your organization has generated and consumed in the reporting year.

	Total Gross generation (MWh)	Generation that is consumed by the organization (MWh)	Gross generation from renewable sources (MWh)	Generation from renewable sources that is consumed by the organization (MWh)
Electricity	7,172	7,172	7,172	7,172
Heat	0	0	0	0
Steam	0	0	0	0
Cooling	0	0	0	0

C8.2f

(C8.2f) Provide details on the electricity, heat, steam and/or cooling amounts that were accounted for at a low-carbon emission factor in the market-based Scope 2 figure reported in C6.3.

Basis for applying a low-carbon emission factor

Off-grid energy consumption from an on-site installation or through a direct line to an off-site generator owned by another company

Low-carbon technology type

Solar PV

Region of consumption of low-carbon electricity, heat, steam or cooling

Asia Pacific

MWh consumed associated with low-carbon electricity, heat, steam or cooling

1,095

Emission factor (in units of metric tons CO2e per MWh)

0

Comment

First Solar installed 7,820 modules to power our manufacturing facility in Kulim, Malaysia. The 750kW installation generates enough energy to power 350 average Malaysian homes and displace 750 metric tons of CO2-eq annually, which is the equivalent of removing 150 cars from the road and saving over 1.4 million liters of water per year, based on national averages.The electricity generated is used for self-consumption.

Basis for applying a low-carbon emission factor

Off-grid energy consumption from an on-site installation or through a direct line to an off-site generator owned by another company

Low-carbon technology type

Solar PV

Region of consumption of low-carbon electricity, heat, steam or cooling

Europe

MWh consumed associated with low-carbon electricity, heat, steam or cooling

2,705

Emission factor (in units of metric tons CO2e per MWh)

0

Comment

First Solar installed four PV installations (totaling 2.9MW) on our recycling facility in Frankfurt Oder, Germany. The installations generate enough energy to power over 700 average German homes and displace over 1,200 metric tons of CO2-eq emissions per year, based on national averages.The electricity generated is used for self-consumption.

Basis for applying a low-carbon emission factor

Off-grid energy consumption from an on-site installation or through a direct line to an off-site generator owned by another company

Low-carbon technology type

Solar PV

Region of consumption of low-carbon electricity, heat, steam or cooling

North America

MWh consumed associated with low-carbon electricity, heat, steam or cooling

3,372

Emission factor (in units of metric tons CO2e per MWh)

0

Comment

First Solar installed a 2.75MW rooftop and ground-mount PV installation at our Perrysburg, Ohio manufacturing facility. The PV installation generates enough energy to power 290 average local homes and displace 1,920 metric tons of CO2-eq emissions per year, based on the regional average grid. The electricity generated is used for self-consumption.

C9. Additional metrics

C9.1

(C9.1) Provide any additional climate-related metrics relevant to your business.

Description

Waste

Metric value

8.5

Metric numerator

grams

Metric denominator (intensity metric only)

Watt produced

% change from previous year

12

Direction of change

Decreased

Please explain

In 2018, our manufacturing waste intensity decreased by 12% primarily due to increased manufacturing throughput related to the ramp up of our Series 6 production lines.

Description

Energy usage

Metric value

0.25

Metric numerator

kilowatt hours

Metric denominator (intensity metric only)

Watt produced

% change from previous year

9

Direction of change

Increased

Please explain

In 2018, our manufacturing energy intensity increased by approximately 9% compared to 2017 primarily due to higher under-utilization associated with the initial ramp of Series 6 manufacturing.

Description

Other, please specify

Water

Metric value

1.25

Metric numerator

Liters

Metric denominator (intensity metric only)

Watt produced

% change from previous year

2

Direction of change

Increased

Please explain

In 2018, First Solar's manufacturing water intensity increased 2% due to the ramp up of production and the start-up of new manufacturing facilities.

C10. Verification

C10.1

(C10.1) Indicate the verification/assurance status that applies to your reported emissions.

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place

Scope 2 (location-based or market-based)	Third-party verification or assurance process in place
Scope 3	No third-party verification or assurance

C10.1a

(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 and/or Scope 2 emissions and attach the relevant statements.

Scope

Scope 1

Verification or assurance cycle in place

Triennial process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

11435 FSI 2018 WRI GHG Statement 2019-06-15 signed (1).pdf

Page/ section reference

Pages 1-3

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

Scope

Scope 2 market-based

Verification or assurance cycle in place

Triennial process

Status in the current reporting year

Complete

Type of verification or assurance

Limited assurance

Attach the statement

11435 FSI 2018 WRI GHG Statement 2019-06-15 signed (1).pdf

Page/ section reference

Pages 1-3

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

C10.2

(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?

No, we do not verify any other climate-related information reported in our CDP disclosure

C11. Carbon pricing

C11.1

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

No, and we do not anticipate being regulated in the next three years

C11.2

(C11.2) Has your organization originated or purchased any project-based carbon credits within the reporting period?

No

C11.3

(C11.3) Does your organization use an internal price on carbon?

No, and we do not currently anticipate doing so in the next two years

C12. Engagement

C12.1

(C12.1) Do you engage with your value chain on climate-related issues?

Yes, our suppliers

Yes, our customers

Yes, other partners in the value chain

C12.1a

(C12.1a) Provide details of your climate-related supplier engagement strategy.

Type of engagement

Compliance & onboarding

Details of engagement

Included climate change in supplier selection / management mechanism
Climate change is integrated into supplier evaluation processes

% of suppliers by number

8

% total procurement spend (direct and indirect)

16

% Scope 3 emissions as reported in C6.5

6

Rationale for the coverage of your engagement

First Solar evaluates new suppliers using a balanced scorecard which focuses on the areas of Quality, Cost, Flexibility, Service, Technology and Sustainability. The EHS section of our supplier audit tool uses the Responsible Business Alliance (formerly known as the Electronics Industry Citizenship Coalition) Code of Conduct as a framework and encompasses topics such as environmental management, health and safety, labor and human rights, and ethics. Our supplier audit tool also includes questions on energy consumption, GHG emissions goals and targets, as well as other environmental performance objectives. We prioritize our engagement by focusing on our module and system component suppliers. Suppliers with a potential of being high risk based on California's Transparency in Supply Chains Act (SB 657) were prioritized for assessment in 2018. We assessed ~8% of suppliers in 2018, representing 16% of our spend and 6% of our total scope 3 emissions. This was estimated based on 16% of our 2018 Scope 3 Emissions from purchased goods and services (388,421 metric tons CO2-eq) which amounts to 62,147 metric tons CO2-eq, divided by total 2018 scope 3 emissions (1,013,310) = 6% of total scope 3 emissions. We expect the proportion of suppliers engaged and the % of procurement spend they represent to increase as we continue to roll out our supplier audit tool. Before any materials are used in our manufacturing process, a supplier must undergo a rigorous qualification process.

Impact of engagement, including measures of success

Suppliers are scored in terms of low, medium and high risk to determine whether further engagement or corrective actions are needed. First Solar’s Supplier Quality group trends and monitors on a monthly basis the number of non-conformances and drives the supplier to provide permanent corrective actions to prevent any reoccurrence of issues. After completing an onsite assessment, suppliers are more aware of First Solar's

environmental, health and safety (EHS) requirements. Results from audits have led suppliers to make improvements such as creating or improving recycling programs, EHS objectives and targets. The audits have also resulted in increased supplier employee EHS awareness, improved EHS labeling and signage in the workplace, as well as better use of personal protective equipment (PPE) for specific tasks. Per the criteria for scoring suppliers for EHS audits, the assessed suppliers scored an average of 88%.

Comment

C12.1b

(C12.1b) Give details of your climate-related engagement strategy with your customers.

Type of engagement

Collaboration & innovation

Details of engagement

Other – please provide information in column 5

% of customers by number

100

% Scope 3 emissions as reported in C6.5

0

Please explain the rationale for selecting this group of customers and scope of engagement

We work with electric utility customers to meet government mandated renewable portfolio standards through solar PV deployment. We work with commercial/industrial customers to meet carbon mitigation/neutrality goals through solar PV deployment. Since our products (solar PV modules) are energy producing rather than energy consuming products, they represent 0% of our scope 3 emissions.

Impact of engagement, including measures of success

These engagements receive high priority as they are commercial opportunities. Success is measured by the performance of our
solar PV projects and the amount of conventional grid electricity that is displaced. In 2018, First Solar produced 2.7 GW of PV solar modules and our company-wide scope 1 and scope 2 greenhouse gas emissions amounted to approximately 0.35 million metric tons of CO2 equivalent. Assuming worldwide average irradiance and grid electricity emissions, we conservatively estimate that our 2018 products are being used to displace 1.9 million metric tons CO2e per year for the 25+ year product life.

C12.1c

(C12.1c) Give details of your climate-related engagement strategy with other partners in the value chain.

C12.3

(C12.3) Do you engage in activities that could either directly or indirectly influence public policy on climate-related issues through any of the following?

Direct engagement with policy makers
Trade associations
Funding research organizations
Other

C12.3a

(C12.3a) On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
Clean energy generation	Support	First Solar actively supported clean energy generation policies in state legislatures and regulatory proceedings in a large number of states including CA, NV, UT, AZ, NC, VA, OH, MD, GA, FL, IN, NJ, NY. First Solar engages directly by providing comments, testimony, and meeting with legislators, regulators and staff. First Solar also engages indirectly through trade associations.	First Solar has advocated for expanded Renewable Portfolio Standards (RPSs) and clean energy procurement requirements for utilities in states that don't have existing RPS policies. First Solar has also defended existing policies where they are under threat (e.g. OH). We supported clean energy generation policies in line with our business objectives of promoting large-scale solar. First Solar's work supported successful legislative efforts in VA (SB966), CA (SB100) in 2018 while setting the stage for success in other states in 2019.
Other, please specify Integrated resource planning	Support	First Solar engages directly and indirectly through trade associations with utilities and regulators to improve integrated resource planning for clean energy generation, specifically for utility scale PV. First Solar	This is a regulatory matter that directly influences procurement strategy for conventional, vertically integrated utilities and their regulators. First Solar has engaged in IRP proceedings in the following states with the end

		regularly provides utilities with updated pricing and technology information to ensure that their integrated resource planning processes have the most up to date (often the most competitive) pricing information available.	goal of increasing carbon-free electric generation: CA, NV, AZ, UT, OR, NC, VA, IN.
Clean energy generation 1	Support	Active outreach in favour of an increased renewable energy targets, and for removing administrative obstacles to clean energy corporate PPAs in EU member states. Engaged EU and national regulators both directly and through trade association.	First Solar supported the EU Clean Energy package with no exception and provided wording around the draft article on corporate PPAs. First Solar, along with other actors in the renewable industry, helped to secure a target of 32% renewables in the EU energy mix by 2030.
Other, please specify European Commission Product Environmental Footprint Pilot Phase	Support	First Solar is a leading member of the Technical Secretariat to develop Life Cycle Assessment-based Product Environmental Footprint Category Rules for PV electricity generation under the European Commission's Single Market for Green Products Initiative Pilot process on Product Environmental Footprinting. In 2018, the development of the Product Environmental Footprint Category Rules for Photovoltaic Electricity Generation was successfully finalized and acknowledged by all EU Member States.	First Solar supported the development of the Product environmental Footprint category rules for PV without exceptions. The PEF pilot phase results for photovoltaic electricity generation were subsequently introduced in EU policy discussions on potential sustainable product policy instruments (Eco-Design, Eco-Labeling, Energy Labeling) for photovoltaic modules, inverters and systems.

1EU Clean Energy Package

C12.3b

(C12.3b) Are you on the board of any trade associations or do you provide funding beyond membership?

Yes

C12.3c

(C12.3c) Enter the details of those trade associations that are likely to take a position on climate change legislation.

Trade association

Business Council for Sustainable Energy (BCSE)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Business Council for Sustainable Energy (BCSE) is committed to advancing the solution technologies and policies that will help reduce emissions. BCSE supports market-based climate change legislation that allows for flexibility and cost-effective emissions reductions, including carbon offsets. The Council has long supported the development and use of output-based emissions regulations as effective ways to promote long-term air quality and to encourage cost-effective emissions reductions. The BCSE has represented the views of clean energy industries in the United Nations Framework Convention on Climate Change (UNFCCC) since 1992. In 2015, BCSE supported an ambitious international climate change agreement as a means of driving low-carbon investment and innovation. In 2017, BCSE sent a letter to President Donald J. Trump urging the United States to remain engaged in the Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC). The letter stated that the Paris Agreement benefits American businesses and protects American jobs.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar contributes to position papers which promote the adoption of energy policies that support the adoption of solar energy and other renewable energy technologies to reduce CO2 emissions and mitigate the impacts of climate change. First Solar was one of BCSE's 52 corporate and trade association members which supported the letter strongly encouraging the United States government to remain engaged in both the Paris Agreement and the UNFCCC.

Trade association

Large-Scale Solar Association (LSA)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

LSA works with its member companies to represent the utility-scale solar industry in important policy discussions, furthering support for large-scale solar development. LSA's principal jurisdictional focus is in California, although LSA sometimes engages with

respect to legislation and regulatory matters in other western U.S. states. Key policy areas of focus include recognition of the societal value and economic benefits of climate mitigation policies; progressive utility procurement policies; progressive pricing and tax policies; rational and environmentally sound land use policy; and transmission reform and expansion.

How have you influenced, or are you attempting to influence their position?

As a member of LSA's Board, First Solar participates in developing LSA's advocacy positions with respect to legislation and regulatory matters concerning climate change, clean energy policy and related infrastructure issues.

Trade association

American Council on Renewable Energy (ACORE)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

ACORE, a 501(c)(3) non-profit membership organization, is dedicated to building a secure and prosperous America with clean, renewable energy. ACORE convenes thought leadership forums and creates energy industry partnerships to communicate the economic, security and environmental benefits of renewable energy. ACORE's policy work focuses on key tax, finance, grid modernization and other issues that are important for renewable energy expansion. ACORE is focused on the accelerated transition to a renewable energy economy to reduce emissions and mitigate risks associated with climate change. ACORE's analysis suggests that the U.S. federal government's prior climate goals for 2025 remain achievable, despite reduced regulation of greenhouse emissions through a 50 percent reduction in power sector emissions. To achieve a 50 percent reduction in power sector greenhouse emissions by 2025, ACORE focuses on strategically promoting the most viable measures that facilitate growth and investment for renewables and enabling technologies, including carbon pricing or other stable long-term policies that incentivize innovation and investment in carbon-free electricity generation.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar contributes to and supports position papers on tax and energy policies that affect the financing, development, and procurement of renewable energy. First Solar supported and contributed to ACORE's comments on the Proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units. First Solar and ACORE proposed suggestions to give states the tools and incentives necessary to deploy low-cost renewable solutions e.g. state-specific renewable energy goals.

Trade association

Interwest Energy Alliance

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Interwest Energy Alliance is a non-profit trade association that brings the nation's renewable energy industry together with the West's advocacy community in a consensus-based, collaborative approach to market development in the West (AZ, CO, NV, NM, UT & WY). Interwest is a regional partner of the American Wind Energy Association and Advanced Energy Economy, and has played a key role in legislation expanding opportunities for renewable energy resources in the inter-mountain West.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar participates in and is supportive of the association's overall mission and programs to advance the clean energy agenda.

Trade association

Texas Solar Power Association

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

TSPA works with its member companies to represent the solar industry in important policy discussions in Texas, furthering solar development at the Legislature, Public Utilities Commission and the Electric Reliability Council of Texas. Key policy areas of focus include recognition of the economic benefits of solar development including reducing greenhouse gas emissions; the need for regulatory certainty, including developing a state based CPP compliance plan; transmission expansion; and leveraging competitive market forces to increase the deployment of solar in the state.

How have you influenced, or are you attempting to influence their position?

As a member of TSPA's Board, First Solar participates in developing TSPA's advocacy positions with respect to legislation and regulatory matters concerning climate change, clean energy policy and related infrastructure issues.

Trade association

Georgia Large Scale Solar Association (GLSSA)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Georgia Large Scale Solar Association (GLSSA), is a non-profit trade association consisting of businesses that promote the economic and environmental benefits of solar

energy generation in Georgia. First Solar formed GLSSA along with other solar developers active in Georgia to intervene in Georgia Power's IRP with a goal of expanding utility-scale solar markets in the state. GLSSA promotes low carbon energy generation like utility-scale solar as a means of tackling climate change.

How have you influenced, or are you attempting to influence their position?

As a member of GLSSA's Executive Committee, First Solar participates in developing GLSSA's advocacy positions with respect to legislation and regulatory matters concerning climate change, clean energy policy and related infrastructure issues.

Trade association

Solar Power Europe

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

SolarPower Europe (formerly known as EPIA or the European Photovoltaic Industry Association) aims to shape the regulatory environment and enhance business opportunities for solar power in Europe. SolarPower Europe supports policies that advance an energy system based on renewable energy and energy efficiency to remain below a 2°C temperature increase.

How have you influenced, or are you attempting to influence their position?

As a board member and Vice-Chair of the Strategy Committee, First Solar contributes to PV industry position papers to promote further renewable energy deployment in Europe through ambitious targets and consistent PV energy policies.

Trade association

International Thin Film Solar Industry Association PVThin a.i.s.b.l.

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

PVthin is an international, not-for-profit coalition representing global leaders in the thin-film solar industry. Its objective is to strengthen global energy security and support the transition to a low carbon economy by promoting the social, economic and environmental benefits of thin-film solar photovoltaic technologies. The activities of the coalition currently focus on: • Advocating thin film PV as a solution for energy security, climate change and water scarcity • Promoting policies that reward sustainable business practices such as resource efficiency and advanced closed-loop recycling schemes • Sharing and promoting best practices in environment, health and safety management • Advancing a recycling standard for PV modules under the EU WEEE Directive • Participating in the development of the European Commission's Product Environmental

Footprint Category Rules for PV electricity generation • Supporting the development of an EU Ecolabel for PV based on Life Cycle Assessment (LCA) approach.

How have you influenced, or are you attempting to influence their position?

As Board Member and President of the Association, First Solar supports and drives the engagement of the Association in relevant policy discussions related to solar energy.

Trade association

Climate Leadership Council

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Climate Leadership Council promotes a carbon dividends framework as the most cost-effective, equitable and politically-viable climate solution. The plan calls for a substantial, gradually rising, revenue-neutral carbon tax with the revenue distributed to citizens.

How have you influenced, or are you attempting to influence their position?

As a founding member, First Solar supports the Climate Leadership Council's mission and carbon dividends plan. "First Solar is uniquely positioned as a leader in the world's sustainable energy future. Our commitment to enabling national energy grids, corporate procurement groups and local communities worldwide to incorporate clean, renewable energy is squarely aligned with the Climate Leadership Council's mission. We see this effort as a crucial forum for informed advocacy of realistic climate protection solutions that make sense for global environmental and economic interests." — Mark Widmar, Chief Executive Officer

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Trade association

Utah Clean Energy Association

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Utah Clean Energy leads and accelerates the clean energy transformation with vision and expertise. They are committed to creating a future that ensures healthy, thriving communities for all, empowered and sustained by clean energy. Through advocacy, education, and diverse partnerships, Utah Clean Energy continues to advance renewable energy and energy efficiency in Utah and the Western Region. Today, Utah Clean Energy has become Utah's independent resource for clean energy policy, regulatory, and consumer information.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar participates in and is supportive of the association's overall mission and programs to advance the clean energy agenda.

Trade association

North Carolina Clean Energy Business Association

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The NC Clean Energy Business Alliance strengthens the political voice for clean energy through education, outreach, and direct lobbying of decision-makers. NCCEBA advocates for a business-friendly environment for clean energy businesses at all levels, from the North Carolina Utilities Commission, Public Staff, and other agencies, to Federal, County, and local levels. NCCEBA's team of lobbyists work with legislators and government officials to make sure clean energy business interests are well represented at the North Carolina General Assembly and with the Governor's Office.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar participates in and is supportive of the association's overall mission and programs to advance the clean energy agenda.

C12.3d

(C12.3d) Do you publicly disclose a list of all research organizations that you fund?

No

C12.3e

(C12.3e) Provide details of the other engagement activities that you undertake.

1. IEA Photovoltaic Power Systems (PVPS) Program

i) First Solar engages through a group by participating in the IEA's PV task committee 12.

ii) IEA PVPS Task 12 aims to foster international collaboration on PV safety and sustainability by quantifying the environmental profile of PV in comparison to other energy technologies and defining and addressing Environmental, Health, and Safety (EHS) and sustainability issues that are important for market growth.

iii) First Solar engages by contributing to the development of methodology guidelines, best practice white papers, reports, scientific articles, and participation in international expert workshops. First Solar was a contributing author to a publication on end-of-life management of photovoltaic panels, which was published by the IEA PVPS Task 12 and the International Renewable Energy Agency (IRENA). Through its leadership of the Strategy Committee of SolarPower Europe (a member organization of the IEA PVPS), First Solar co-leads the task 12 as deputy operating agent.

iv) First Solar supports the development of internationally accepted and harmonized standards for life cycle assessment, along with minimum standards for EHS in manufacturing and

deployment of PV power systems, and best practice exchange within the industry and policymakers.

2. International Renewable Energy Agency (IRENA)
i) First Solar engages through a group of leading renewable energy advocates from both industry and civil society.
ii) IRENA focuses on enabling the transition to renewable energy for a sustainable energy future.
iii) As a Coalition for Action member organization, First Solar has committed to supporting the energy transition by promoting the sustainable use of renewable energy technologies; making a compelling case for renewable energy by collectively compiling the latest knowledge and examples; communicating renewable energy with the public through clear, truthful messages; addressing public concerns over renewable energy technologies by applying best practices and engaging concerned parties; sharing evidence, communications material, ideas and contacts with fellow Coalition members to strengthen the cases and support for renewable energy.
iv) As a founding member of the coalition, First Solar supports all objectives and commitments to promote the energy transition through the sustainable use of renewable energy technologies.

C12.3f

(C12.3f) What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?

Our vision "to lead the world's sustainable energy future" drives every aspect of our business strategy from developing sustainable solar markets, reducing our operational impacts, increasing the efficiency of our products, reducing the levelized cost of solar electricity to compete with fossil fuels, and improving the environmental benefits offered by our technology on a life cycle basis. First Solar established a global Sustainability program in 2011 to bring together all sustainability related activities across the company under one initiative. First Solar's Sustainability program drives the company's environmental, social, and economic priorities; including life cycle carbon footprint analysis and GHG intensity reduction goal, responsible land use, waste management, supply chain sustainability and our industry-leading recycling services. First Solar's strategy includes engagement with key policy makers in all our markets and at regional and international level to promote the development and deployment of PV solar as a solution to climate change and energy security, and advocate policies that facilitate these goals. First Solar's Public Affairs team is responsible for guiding public policy that drives demand for solar in target markets, monitoring relevant legislative and regulatory proceedings, advancing First Solar's project pipeline, and managing worldwide stakeholder engagement. First Solar's Public Affairs team works closely with Business Development, the Sustainability and EHS teams, and the Executive Leadership Team to support the development of solar PV energy projects in various markets as part of our mission to provide cost-advantaged solar technology through innovation, customer engagement, industry leadership, and operational excellence.

C12.4

(C12.4) Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Publication

In mainstream reports

Status

Complete

Attach the document

First-Solar-Inc.-2018-Annual-Report-Web-Posting.pdf

Page/Section reference

pg. 3 (CEO Message), 4, 6, 20-21

Content elements

Strategy

Risks & opportunities

Other, please specify

Sustainability advantage of our solar module technology

Comment

Publication

In voluntary sustainability report

Status

Complete

Attach the document

FirstSolar_SustainabilityReport_2018.pdf

Page/Section reference

1, 6, 9-10, 13-21, 37-44, 47, 49, 56

Content elements

Governance

Strategy

Risks & opportunities

Emissions figures
Emission targets
Other metrics

Comment

Publication
In voluntary communications

Status
Complete

Attach the document

First-Solar-Sustainability-Metrics-21JUN19.pdf

Page/Section reference
1-10

Content elements
Emissions figures
Emission targets
Other metrics

Comment

C14. Signoff

C-FI

(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.

C14.1

(C14.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	Chief Information Officer | Chief Sustainability Officer | SVP Global Technical Services	Chief Sustainability Officer (CSO)

Submit your response

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

	Public or Non-Public Submission	I am submitting to
I am submitting my response	Public	Investors

Please confirm below

I have read and accept the applicable Terms