

## **Environmental and Social Review Summary – Canadian Solar (#36142)**

### **Project Description:**

Founded in 2001 and listed on the NASDAQ since 2006, Canadian Solar (“Canadian Solar”, the “group” or “company”) is one of the world’s largest photovoltaic (“PV”) solar module suppliers and a vertically integrated manufacturer including flexible manufacturing capacities with downstream businesses from ingot, to wafer to cell to module products. Headquartered in Guelph, Ontario/Canada, the company’s two main lines of business are: (i) the manufacturing and sale of solar PV modules (55.5% of Canadian Solar’s total net revenues in FY2014); and (ii) the development, construction and sale of solar PV projects, working with both build-to-sell and build-to-hold business models.

Currently the main manufacturing activities of the company are in China (85% of total capacity) and Canada. Solar PV models are produced at three major module manufacturing facilities located in Guelph, Ontario/Canada, Luoyang (Henan Province) and Changshu (Jiangsu Province), China. All modules manufactured in 2015 have a total capacity of 3,800 MWp when operational in peak conditions (accumulated peak capacity). The manufacturing plants located in Suzhou (Jiangsu Province) and a newly established facility in Funing, China produce cells with 2,300 MWp peak capacity (as produced in 2015). The ingots/wafers manufacturing plant located in Luoyang annually produces wafers with 400 MWp peak capacity.

In order to meet the expected strong growth in global demand for solar modules the company is increasing its manufacturing capacity with plans to expand its wafer, cell and module capacities to 1.0 GWp, 3.4 GWp and 5.63 GWp respectively by December 31, 2016. The company’s wafer manufacturing capacity at its Luoyang plant is expected to reach 1.0 GWp by June of 2016 and the company’s cell manufacturing capacity at its Funing plant is expected to reach 1.0 GWp by July of 2016. In addition, a new 400 MWp cell manufacturing plant is expected to be commissioned in the second half of 2016 in a location still to be defined. The company’s planned module manufacturing capacity by the end of 2016 includes 3.0 GW in Changshu, and 1.1 GW in Luoyang, while approximately 1.53 GW will be at existing and new locations outside China, including Canada, Vietnam, Indonesia, potentially Brazil and other emerging markets.

The plant referred to above in Funing was built by a joint venture between Canadian Solar with GCL-Poly, one of the largest manufacturers of polysilicon and wafers based in Jiangsu, China. The company also has ongoing partnership agreements for module assembly with various original equipment manufacturers (“OEMs”) in South East Asia and is targeting new manufacturing plants in different regions to serve local markets, which could potentially include Brazil. A new module manufacturing facility is being established currently in the Vietnam Singapore Industrial Park, Hai Phong, Vietnam.

Canadian Solar has built a significant track record as a project company and has diversified into other markets by building and connecting more than 1.74 GWp of projects (including projects developed and connected by its wholly owned subsidiary, Recurrent Energy, a solar energy developer in North America) either as an engineering, procurement and construction (“EPC”) contractor, or project developer. As of November 2015 the company had secured a late stage pipeline of 2.5 GWp of projects located in Japan, China, Canada, Brazil, United States and the United Kingdom.

The investment in which IFC will participate (“the project”) involves: (i) purchase of up to \$10 million of shares in the company; and (ii) loans of up to \$40 million for IFC’s own account and \$20 million as part of the Managed Co-Lending Portfolio Program. The proceeds of the equity and loans will be directed towards the manufacturing facility in Vietnam and those to be potentially constructed in Brazil as well as general corporate finance purposes related to manufacturing operations in emerging markets.

**Overview of IFC’ Scope of Review:**

IFC’s environmental and social review of this project included:

- Discussions with Canadian Solar’s management (including the Chief Operating Officer, Strategic Development, public relations and Human Resources (“HR”));
- Discussions with Canadian Solar’s personnel regarding environmental, health and safety (“EHS”) performance and labor practices;
- Site visits to the ingots/wafer production facility in Luoyang, China; modules assembling plant in Changshu, China, and cells manufacturing facilities in Suzhou, China during February 2 – 5, 2015;
- A review of EHS information provided in response to IFC’s environmental and social questionnaire and information obtained from follow-up discussions. Reviewed documentation include the company’s EHS policies and procedures e.g., on hazardous materials and waste management, environmental monitoring, contractor management, EHS procedures for contractors involved in solar farms construction activities in Canada, the program for drills and trainings in 2015, supply chain requirements, ISO 14001/OHSAS 18001 certification audit reports (for plants in China and Canada), a study of the carbon footprint, EHS annual plans, examples of internal EHS audits, data on EHS performance in 2014, incident investigation reports prepared in 2014, key EHS performance indicators for each plant for 2015, information on wastewater treatment in Luoyang, the Environmental Impact Assessment report for the Funing plant and the non-financial reports as publicly disclosed for 2013 and 2014;
- Discussions with Ontario (Canada) plant management; and
- A review of labor documentation (e.g., labor statistics, HR policies and procedures).

**Identified Applicable Performance Standards:**

PS1: Assessment and Management of Environmental and Social Risks and Impacts

PS2: Labor and Working Conditions

PS3: Resource Efficiency and Pollution Prevention

PS4: Community Health, Safety and Security

**Environmental and Social Categorization and Rationale:**

All existing manufacturing plants in China are located within existing government industrial parks. Based on information reviewed by IFC the proposed investment is expected to have limited environmental and social impacts which are expected to be site-specific and none is expected to be significant. Further, these impacts can be avoided or mitigated by adhering to recognized performance standards, procedures, guidelines and design criteria, as described in the following sections. Thus this is a Category B project in accordance with IFC’s Environmental and Social Sustainability Policy.

Key environmental and social items considered applicable to this appraisal include: (i) the company's capacity to; (a) identify, assess and manage EHS risks and impacts associated with its existing manufacturing activities as well as construction and operation of new manufacturing plants, (b) identify, assess and manage EHS risks and impacts associated with joint venture activities with Canadian Solar's participation, (c) identify and manage occupational health and safety ("OHS") risks and impacts associated with; (i) the primary supply chain of operations; (ii) labor and working conditions; (iii) management of wastewater, air emissions, wastes and hazardous materials; and (iv) land acquisition. Actions have been defined in the ESAP to address these issues and ensure compliance with IFC's Performance Standards ("PSs") and the applicable World Bank Group ("WBG") EHS Guidelines.

The local governments constructed the industrial parks in China and Vietnam more than 5 years ago and the land was acquired from village collectives or individual villagers. At the time the local governments paid compensation for loss of land and housing in accordance with local regulations. Resettlement was conducted as part of areas broader industrial park development and was not done in anticipation of Canadian Solar's projects which occupy less than 5% of the total size of the industrial parks. Thus PS5: Land Acquisition and Involuntary Resettlement is not applicable to these facilities. In going forward and as outlined below, the company will however develop and implement a procedure to ensure compliance with PS5 for the purpose of future developments.

Similarly, given that the company's manufacturing facilities are located in developed industrial zones, PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, PS7: Indigenous People, and PS8: Cultural Heritage are not considered applicable to this project. Future projects will consider the applicability of these PS's when the environmental and social assessment for these is undertaken prior to development.

### **Key Environmental and Social Issues and Mitigation:**

IFC's appraisal considered environmental and social management plans for the project and gaps if any between these plans and IFC requirements. Where necessary, corrective measures intended to close these gaps within a reasonable period of time, are summarized in the paragraphs that follow and in the agreed Environmental and Social Action Plan ("ESAP") disclosed in this review summary. Given the implementation of both, the management plans and the ESAP, the project including all existing and agreed designated future manufacturing operations are expected to be designed, build and operated in accordance with IFC's Performance Standards objectives.

### **PS1: Assessment and Management of Environmental and Social Risks and Impacts**

#### *Policy*

Canadian Solar's management has defined its commitment to continuous improvement of EHS performance in its corporate quality and EHS policy and considers these issues as central to their corporate strategy. The company has developed and implemented EHS management systems for the Changshu, Luoyang and Ontario module assembling plants and Suzhou cells manufacturing plant that are certified against ISO 14001 and OHSAS 18001, environmental and OHS management systems respectively. Similar EHS policy and procedures have been developed for the Luoyang ingots/wafers manufacturing plant with the final ISO 14001 and

OHSAS 18001 certification audit to occur in 2017. All of Canadian Solar's key products are also certified against ISO 9001, quality management system.

In accordance with the ESAP, Canadian Solar will develop and implement EHS management systems aligned with ISO 14001, OHSAS 18001 and the requirements of the Performance Standards for all future manufacturing plants whether developed or acquired.

#### Identification of risks and impacts

In accordance with the national legislation in China an Environmental Impact Assessment ("EIA") is required for construction of the manufacturing facilities. As part of the national approval process the company undertook an EIA for the Funing plant in 2014 and relevant approvals from the environmental authorities were obtained. The latter included public engagement in accordance with local regulations. The EIA was developed for the initial phase of Funing project development (300 MW) and the EIA complies with IFC's requirements. The company will develop amendments to the EIA to reflect the second stage of the project (up to 1 GW) that the company expects to develop. For the purpose of new developments, the Canadian Solar will also undertake an Environmental and Social Impact Assessment ("ESIA") in compliance with national requirements and aligned with the PSs; these requirements are defined in the ESAP. In addition and specifically to address the requirements of Performance Standard 5: Land Acquisition and Involuntary Resettlement, the company will develop and implement a procedure so as to review new developments or acquisitions against the requirements of this PS. Where gaps are identified, the company will implement measures to ensure compliance; this requirement is defined in the ESAP.

For existing operations, Canadian Solar's internal EHS management systems and associated procedures adequately assess EHS risks and define necessary mitigation measures. The latter is supported by annual EHS plans to maintain implementation of the EHS management systems across all operations. Furthermore, the company has also developed and implemented detailed EHS procedures (obligatory for contractors) for construction and operation of its solar farm projects in Canada, Japan and China; these adequately identify and mitigate risks and impacts inherent to activities. For further enhancement of EHS risk management the company will undertake a similar process of EHS risk identification for the joint venture in Funing and EHS mitigation measures and plans will be prepared accordingly.

Regular EHS monitoring is carried out in accordance with the relevant corporate procedures, which specify key principles and responsibilities. Annual EHS monitoring plans are developed which include monitoring criteria related to air emissions, wastewater discharge, waste generation and disposal, energy efficiency and incidents. Monitoring also includes key performance indicators for lost-time injuries, compliance with regulatory requirements, waste disposal and wastewater discharge (overall compliance with requirements), and energy efficiency. All new manufacturing plants will be subject to similar monitoring plans and procedures as outlined in the ESAP.

#### Organizational capacity and competency

EHS personnel have been appointed at all Canadian Solar facilities and corporate EHS staff (based in Suzhou, China) provides overall guidance on EHS issues to the manufacturing staff based in China. Each corporate manufacturing entity employs EHS specialists responsible for permitting, supervising, reporting and monitoring activities. The responsibilities of Canadian Solar's EHS department include EHS onboarding for new staff, ongoing training for regular staff,

monitoring and collection of EHS performance data and compilation of reports, investigations of incidents and EHS risk analysis and management. Each EHS Manager appointed at the plant level reports directly to the plant General Manager on day-to-day activities. In addition, issues related to the implementation of corporate policies and procedures are reported to the corporate EHS department. In accordance with the ESAP, the company will define similar roles and responsibilities for overall EHS management of performance at Funing, Vietnam, in Brazil if applicable and at other new manufacturing plants to be developed.

#### Supply chain

The supply chain is a critical part of the operation and the company's supply chain department is supplied with components (e.g., wafers/cells) and materials including polysilicon and various chemicals for its manufacturing processes. In addition, the company has partnership agreements with modules assembling companies and entered into long-term strategic partnerships for silicon, wafers and cells. Key suppliers of Canadian Solar include large companies with global operations and in accordance with the supply chain procedure the company checks and confirms compliance with requirements including compliance with obligatory EHS permits and national legislation. A similar approach to assessing the supply chain will be applied to the new project in Funing and will be applied to Vietnam and any other future manufacturing facilities as defined in the ESAP.

#### Emergency planning

Visited facilities have adequate firefighting equipment in place and fire response teams have been trained. The facilities are designed in accordance with the recommendations of the local Fire Protection Regulations and are remotely located from residential areas. The transport of chemicals is organized by third party suppliers. All buildings have demarcated emergency routes and exits, fire extinguishers, hydrants, smoke detectors and alarms. Emergency response procedures define roles and actions in case of emergency. Fire drills as well as training on various emergencies (e.g., leakages of hazardous materials) are regularly planned and implemented by the company. Similar emergency response procedures will be applied to the Funing facility as well and to future manufacturing plants.

### **PS2: Labor and Working Conditions**

#### Human resources policies and procedures

Currently, Canadian Solar employs more than 8,000 employees worldwide (including approximately 7,220 employees in China). More than 30% of the company's employees are female. In addition, for the new plant in Funing the company expects there will be another 1,300 employees to be added into the workforce. Contractors are involved in the construction activities only in terms of new developments, which can involve new manufacturing facilities or solar power plants.

Hiring is always conducted in accordance with local and state labor law. The company allows trade unions and 48% of total employees have joined the union within China. The implementation of Canadian Solar's investment program will not result in any retrenchment.

Canadian Solar has developed a Corporate HR Policy stipulating key principles on labor rights and working conditions. This Policy specifies rights related to non-discrimination and equal opportunities and include procedures related to recruitment, working hours and overtime, leaves,

grievances, occupational health and safety, training and development. Overall the policy is fully aligned with IFC Performance Standard 2 requirements.

A Grievance Policy has been established at Canadian Solar's plants whereby employees may submit their grievances by email, and in addition an HR employee is designated for discussion of grievances with concerned employees. Furthermore, employees who file a grievance have the right to be accompanied and/or represented by a colleague or representative of their choice during a grievance review meeting. The grievance mechanism complies with IFC's requirements including that related to submission of grievances anonymously.

As described in the ESAP, Canadian Solar will also develop and implement HR policies and procedures aligned with the company's existing approach as outlined above including the additional requirements defined for the manufacturing plant in Funing, Vietnam and any future developments.

In accordance with the Canadian Solar's corporate standards all policies, including the HR Policy, also apply to contractors. According to the company's Standard Work Instruction Contractor Program all contractors are required to comply with applicable legal requirements and Canadian Solar's policies when they commit into a legal relationship with the company. Insofar as third party contractors are concerned such as construction companies, Canadian Solar has developed and implemented guidelines inclusive of monitoring requirements for contractors relative to key principles related to working conditions (wage, hours of work, overtime, etc.) and grievance mechanism in accordance with Performance Standard 2 requirements.

#### Occupational health and safety (OHS)

The Changshu, Luoyang and Ontario modules assembling plants and Suzhou manufacturing plant are OHSAS 18001 certified. In addition, the company plans to obtain OHSAS 18001 certification at the Luoyang manufacturing plant by the third quarter of 2017. The company has established clear roles and responsibilities regarding OHS management at the plant level. The overall coordination of OHS management for plants located in China is carried out by the EHS department based in Suzhou. Each plant in China reports key OHS data to a centralized EHS team based in Suzhou on a monthly basis. Such reports include detailed data on employee injuries. The data reporting on OHS performance in Canada is assigned to the EHS team based in Ontario.

Key OHS hazards of the company's activities are mainly associated with exposure during manufacturing to chemical and physical hazards such as acids, bases, solvents, toxic gases, dust, temperature, noise and energy hazards. The main soldering processes at company's plants are automated and the company is gradually replacing all manual soldering lines with automatic lines to mitigate potential OHS risks.

Canadian Solar provides accommodation for its workers in Changshu and the facility meets national requirements on life and fire safety and is aligned with IFC's requirements.

Internal OHS inspections are carried out regularly and plant management are informed of non-compliance with OHS requirements. Gas analyzers, including alarms, are installed in workshops where hazardous materials are in use and air quality is constantly monitored. In accordance with annual monitoring plans measurements of workplace conditions (dust level, temperature and

noise) are conducted annually and these are in compliance with national requirements and aligned with the World Bank Group EHS Guidelines.

The company implements various preventive measures including use of isolated automated systems to prevent worker exposure to chemicals as well as engineering controls such as dust and vapor extraction and ventilation systems.

Most of the protective measures implemented at plants are focused on the use of personal protective equipment (“PPE”) and proper training of employees. New employees receive initial basic health and safety and fire protection training. OHS training programs are supported by the local EHS departments with further assistance from EHS HQ in China.

Although the company provides PPE to its employees, usage by employees varies. Thus, in accordance with the ESAP, the company will further strengthen its approach regarding PPE use by developing a procedure for use of PPE in specific tasks, as well as signage, training and supervision requirements.

As described above an OHS management system is being developed and implemented currently at the Luoyang manufacturing plant, and plans (including a timeline) have been developed for implementation thereof.

Based on reporting data, the lost-time incident frequency rate per million hours worked for all plants is below sector specific benchmarking data (< 4.0). The company implements various programs to improve safe behavior and if any incident occurs, it is recorded and an investigation is carried out.

Contractors involved in construction activities are presented with detailed OHS requirements prior to the commencement of construction work. A similar approach will be applied to construction activities associated with new plants. Canadian Solar has confirmed in the Standard Work Instruction Contractor Program that contractors shall conform to all applicable legal requirements and Canadian Solar Inc’s policies with regard to all workers engaged by third parties.

### **PS3: Resource Efficiency and Pollution Prevention**

Water is used for cleaning and cooling of components, as well as for preparation of chemical solutions. The highest consumption of water is at the Suzhou plant followed by Changshu and Luoyang processing plants. Canadian Solar undertakes monitoring of energy and water consumption and the data is used for planning of activities to reduce resources consumption.

Canadian Solar continuously identifies projects so as to decrease use of raw materials as well as reduce waste generation and air emissions. In addition, the company implements various energy efficiency initiatives such as application of power saving lighting and replacement of technological equipment by equipment with lower power costs per production unit.

Total GHG emissions are estimated at 180,000 tons CO<sub>2</sub> equivalent based on 2014 process activities (excluding suppliers). The emissions from module manufacturing in Vietnam and another potential manufacturing operations are expected to be 64 kg CO<sub>2</sub> equivalent per kWp of solar panels manufactured (excluding CO<sub>2</sub> emissions generated by its suppliers) which equates

to 57,600 tons CO<sub>2</sub> equivalent per annum once two new module manufacturing plants are operational.

The company estimates it currently produces up to 3,650 tons of wastewater per day at its plants in China, which is treated via on site treatment plants prior to discharge. Wastewater is mainly generated during texturing and the phosphorous doping processes at the Suzhou plant. About 60% of this wastewater is treated on-site and re-used in production processes with the remaining discharged to the municipal sewage treatment system. None of the company's plants discharge wastewater directly to a surface water body. Generally, wastewater which is discharged into the municipal wastewater system is treated in accordance with local standards before being discharged. The company measures wastewater quality discharged on a quarterly basis and undertakes an investigation if the concentration level of fluoride, oil, nitrogen ammonia, biological and chemical oxygen demand exceeds locally permitted levels. Corrective measures (e.g., modernization of the wastewater treatment plant in Loyang, minimization of chemicals usage) are being implemented. A similar approach to wastewater management will be adopted in design and applied by the company at its future operations to ensure compliance with relevant national requirements and the WBG EHS Guidelines requirements. Note: The current quality of wastewater discharged by Canadian Solar into municipal networks is in compliance with relevant sectorial WBG EHS Guidelines.

Each facility has gas emission processing silos relying mainly on a wet scrubbing process to treat gas before being emitted to atmosphere. In accordance with the provided reports government monitoring tests of the gas emissions has demonstrated compliance with national limits and is aligned with the WBG EHS Guidelines for Electronics and Semiconductors.

The company handles solid wastes according to national regulation requirements. The waste management policy clearly defines the respective responsibilities of the departments involved and their collaboration standards to ensure proper waste management. Hazardous waste (e.g., fluoride sludge, chemicals tanks, used oil and chemicals, etc.) is disposed of by licensed contractors at all facilities. This procedure will similarly apply at new operations.

Silicon slurry is generated at the Luoyang ingots/wafers plant during the cutting process. Generated slurry wastes are pumped into closed tanks and collected by an external treatment company for further recycling.

The company facilities are served by a centralized storm water collection and distribution system in the industrial parks in which they are located.

Hazardous materials (various chemicals used in manufacturing process e.g. hydrochloric acid, sulfuric acid, nitric acid and hydrogen fluoride, etc.) are stored in tanks/cylinders and are dispensed automatically in closed systems so to mitigate fire and explosion risks along with accidental leakage.

Similar to the other existing plants of Canadian Solar wastewater generated by Funing is treated at a wastewater treatment facility to meet local standards. During the EIA various measures were designed to ensure compliance with local standards on air emissions and wastewater discharge treatment, wastes handling and hazardous materials management. The designed measures for the initial Funing operations are considered as sufficient to align with the WBG EHS Guidelines.

As outlined above, the company will amend the EIA for the total production capacity and implement any additional mitigation measures to ensure compliance with the WBG EHS Guidelines.

Further, and as previously referenced, the company will identify risks and impacts and will develop and implement corrective measures including monitoring requirements for new developments / acquisitions to ensure compliance with IFC Performance Standards and WBG EHS Guidelines.

#### **PS4: Community Health, Safety and Security**

All of the company's facilities are located remotely from residential areas and unarmed guards protect these facilities. The company has not received any community complaints during the last five years. The transportation of hazardous materials is provided by special suppliers, which are regulated by robust national standards.

#### **Stakeholder Engagement:**

Stakeholder engagement is integral to Canadian Solar's EHS management system with relevant key stakeholders identified for all operations and key information on the company's EHS initiatives being disclosed in the annual sustainability report. Public engagement has been undertaken as part of the EIA in regard to the Funing plant and will similarly take place in the case of new major developments.

Going forward, Canadian Solar shall formalize the approach to communicate environmental and social aspects associated with current and planned operations and in doing so develop a corporate Stakeholder Engagement Plan ("SEP") to include a grievance procedure to be applied at the individual facilities. The SEP shall also define the approach for the communication associated with the development of new facilities and solar power plants globally. These requirements are defined in the ESAP.

The company is involved in various charity activities on an on-going basis and provides donations to health, educational and scientific organizations.

#### **Local Access of Project Documentation:**

Both, the ESRS and the ESAP will be made available via the World Bank Group's InfoShop and will be published on the corporate web-site of Canadian Solar [<http://www.canadiansolar.com>]. The company will also make IFC's environmental and social review summary (ESRS) and ESAP available for consultation at their offices in Ontario, Canada and Suzhou, China.

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### Environmental and Social Action Plan

Task Title & Description	Anticipated Completion Date
Develop and implement a corporate procedure related to: (i) Compilation of an Environmental and Social Impact Assessment (“ESIA”) for new developments in accordance with Performance Standard 1 and national requirements in any relevant region or country; (ii) A review of new developments and acquisitions against the requirements of Performance Standard 5: Land Acquisition and Involuntary Resettlement. The procedure is to facilitate the identification of gaps against the Performance Standard and the approach to adequately addressing such gaps.	31 December 2018
Amend / update the Environmental Impact Assessment (“EIA”) for the Funing plant to take into account the increase in capacity and implement the mitigation measures accordingly.	31 August 2016
Develop and implement an environmental, health and safety (“EHS”) policy and procedures (including roles and responsibilities, mitigation and monitoring plan, emergency response and supply chain procedures aligned with ISO 14001 and OHSAS 18001 and IFC Performance Standard 1 for; i) new manufacturing plants (including Funing); and ii) plants acquired.	31 December 2018
Develop and implement a corporate Stakeholder Engagement Plan (“SEP”) to be applied to all operations and the SEP shall include a grievance mechanism.	15 February 2016
Develop and implement Human Resources (HR) policy and procedures aligned with the existing HR policy and procedures and consistent with PS 2 and inclusive of a grievance mechanism as defined below and apply to; i) new manufacturing plants; and ii) plants acquired.	31 December 2018
Develop and implement a procedure so as to review the usage of personal protective equipment (PPE) relative to all tasks and apply accordingly. The latter is to include requirements associated with signage, training and supervision requirements regarding PPE usage in the requisite tasks.	15 February 2016