



# **CERTIFICATION AND FINANCING PROPOSAL**

## **PUERTO LIBERTAD SOLAR PARK PROJECT IN THE MUNICIPALITY OF PITIQUITO, SONORA**

*Submitted: November 17, 2017*



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## EXECUTIVE SUMMARY

### PUERTO LIBERTAD SOLAR PARK PROJECT IN THE MUNICIPALITY OF PITIQUITO, SONORA

**Project:** The project consists of the design, construction and operation of a 317.5-MWac solar park located in the municipality of Pitiquito, Sonora (the “Project”). It has been divided into two components: Component 1 with 180-MWac and Component 2 with 137.5 MWac.<sup>1</sup> The Project will be carried out by two special-purpose companies. The electricity, Clean Energy Certificates (CECs) and generation capacity produced by Component 1 will be purchased by the Mexican federal electricity commission, (CFE) pursuant to three long-term power purchase agreements (the “CFE PPAs”). The electricity, CECs and generation capacity produced by Component 2 will be purchased by a private off-taker and CFE Calificados S.A. de C.V., pursuant to two long-term power purchase agreements (together with the CFE PPAs, “the Project PPAs”), as well as sold on the spot market.

NADB intends to participate in both components of the Project. At the moment, only Component 1 has obtained a MIA resolution from SEMARNAT. The disbursement of funds to Component 2 will be subject to the satisfactory completion of the MIA process. In the event that the MIA resolution from SEMARNAT for Component 2 is still pending at the time of Project funding, NADB financing will be allocated exclusively to Component 1.

**Objective:** The Project will increase installed capacity of renewable energy resources, which will help reduce future demand on traditional fossil fuel-based energy production and thus help prevent the emission of greenhouse gases and other pollutants from power generation using fossil fuels.

**Expected Outcomes:** The estimated environmental and human health outcomes resulting from the installation of 317.5 MWac of new renewable energy generation capacity at the point of interconnection are:

- a) Generation of approximately 961.55 gigawatt-hours (GWh) of electricity during the first year of operation.<sup>2</sup>

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<sup>1</sup> MWdc stands for megawatts in direct current and MWac stands for MW in alternating current.

<sup>2</sup> Source: Information provided by the Sponsor based on a P50 generation.

- b) An expected reduction of approximately 440,390 metric tons/year of carbon dioxide equivalent (CO<sub>2</sub>e).<sup>3</sup>

**Sponsor:** The private-sector Sponsor is a joint venture between Solar Tuto Energy, S.A.P.I. de C.V. (“BioFields”) and AE Mex Global, S. de R.L. de C.V. (“Acciona”).

**Borrowers:** AT Solar V, S. de R.L. de C.V., and Tuto Energy II, S.A.P.I. de C.V., the special-purpose companies created to carry out the Project.

**NADB Loan Amount:** US\$75.0 million.

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<sup>3</sup> NADB’s CO<sub>2</sub>e calculation is based on the potential emissions avoided as a result of reducing future demand on fossil fuel-based electricity through the use of solar energy generation equivalent to 961.55 GWh/year. Typically, NADB’s CO<sub>2</sub>e calculations are based on emission factors from an energy generation facility close to the Project area, which in this case would be the Puerto Libertad thermoelectric plant recently converted to natural gas. However, its emission factors are not publicly available; therefore, the CO<sub>2</sub>e calculation was based on the national emission factor. National emission factors for sulfur dioxide and nitrogen oxides are not available and, thus, are not considered in the results measurement scheme for this Project, although it is expected the Project will help to reduce the emission of other pollutants.

## CERTIFICATION AND FINANCING PROPOSAL

### PUERTO LIBERTAD PARK PROJECT IN THE MUNICIPALITY OF PITIQUITO, SONORA

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#### 1. ELIGIBILITY

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##### ***Project Type***

The Project falls into the category of clean and efficient energy.

##### ***Project Location***

The Project is located in the municipality of Pitiquito, Sonora, approximately 196 km (121.8 miles) southwest of the U.S.-Mexico border.

##### ***Project Sponsor and Legal Authority***

The private-sector sponsor is a joint venture between Solar Tuto Energy, S.A.P.I. de C.V. (“BioFields”) and AE Mex Global, S. de R.L. de C.V. (“Acciona”) (the “Sponsor”), which will use two special-purpose companies (SPV) to implement the Project. The SPV for Component 1 is AT Solar V, S. de R.L. de C.V., a Mexican-based company established in 2013. The SPV for Component 2 is Tuto Energy II, S.A.P.I. de C.V., a Mexican-based company established in 2015. The Project representatives are Julio Antonio Aguirre Hernandez and Joseph Datshkovsky.

The off-taker for Component 1 is the Mexican federal electricity utility, (CFE), through its subsidiary, and the off-takers for Component 2 are a private company and CFE Calificados (altogether, the “Off-takers”), as well as sales on the spot market. In accordance with the new Power Industry Law, Component 1 was selected on September 28, 2016, through Long-term Energy Auction No. SLP-1/2016 carried out by the National Center of Energy Control (CENACE) on behalf of the Mexican Government.<sup>4</sup>

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<sup>4</sup> Source: CENACE, Auction Decision and Contract Award published September 28, 2016.

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## 2. CERTIFICATION CRITERIA

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### 2.1. TECHNICAL CRITERIA

#### 2.1.1. Project Description

##### Geographic Location

The Project is located in the community of Puerto Libertad in the municipality of Pitiquito, Sonora, approximately 119 miles northwest of the Hermosillo urban area, at the following coordinates: Latitude: 29°57'21.54" N and Longitude: 112°39'5.56" W. The Project will be developed on approximately 1,194 hectares (2,950 acres). Figure 1 below shows the geographic location of the Project.

**Figure 1  
PROJECT MAP**



##### General Community Profile

The Project is expected to benefit border communities near the Project site through the supply of electricity generated by the Project. It is expected that the actual consumption of the renewable energy produced will be the users or communities close to the grid where the interconnection point is located. In this case the nearest communities to this point are the residents of the municipalities of Pitiquito, Puerto Peñasco, Caborca and Hermosillo, which belong to the CFE Northwest Zone. Project benefits include the generation of clean energy equivalent to the annual

consumption of 132,554 households.<sup>5</sup> The construction of the Project will also benefit local communities by generating employment opportunities and additional taxes.

According to the Mexican National Institute of Statistics and Geography (INEGI), in 2015, the population of Sonora was 2,850,330, which represents 2.4% of the population of Mexico. Between 2012 and 2015, its annual growth rate declined from 1.5% to 1.4, which is in line with the national average (1.4%).<sup>6</sup> According to the most current economic information from INEGI, the state of Sonora contributed 2.9% to the gross domestic product (GDP) of Mexico in 2015.

The community of Puerto Libertad is in the municipality of Pitiquito, Sonora, on the coast of the Gulf of California. The total population of Pitiquito was 9,514 in 2015<sup>7</sup> while in the locality of Puerto Libertad was 2,782 residents in 2010.<sup>8</sup> The main economic activities in the municipality of Pitiquito are manufacturing employing 38.1% of the workforce, followed by commerce (29.4%) and private sector financial services (14.7%).<sup>9</sup>

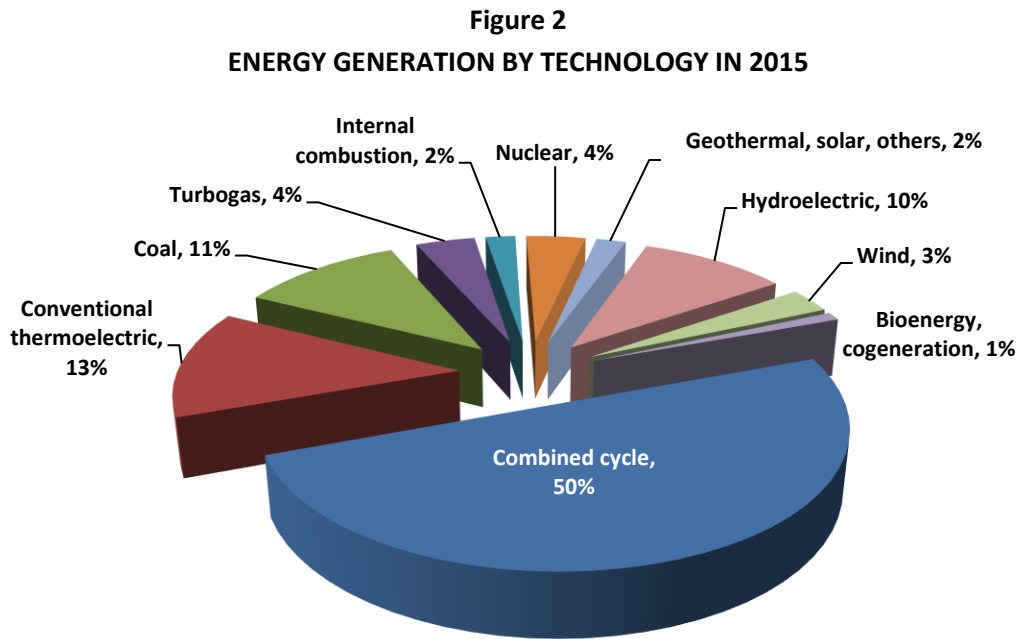
#### Legal Energy Profile

In 2014, the legal framework that governs Mexico's National Power System (SEN) underwent a major reform aimed at facilitating investments to consolidate the diversification efforts, improve infrastructure and meet the growing demand for electricity. Under the new Power Industry Law, the federal government retained control of planning activities and the transmission and distribution infrastructure through CENACE, a decentralized federal agency created by the government to operate the SEN. It is now operating the national grid with 60,000 kilometers (37,000 miles) of transmission and distribution lines previously operated by CFE.<sup>10</sup> Under the reform, CFE became a federally-owned for-profit enterprise. The Mexican Energy Regulatory Commission (CRE), which was created to regulate activities related to private investment in the power and natural gas sector, continues to be responsible for issuing permits to private entities for power generation and the transportation of natural gas.

To promote the use of renewable energy, the Mexican Government has enacted two laws in the past four years. In 2015, Mexico enacted the Energy Transition Law to regulate the sustainable use of energy and obligations regarding clean energy and the reduction of pollution from the power sector.

provisions, that the Mexican Ministry of Energy (SENER), in coordination with CFE and CRE, must increase the use of clean technologies in power generation to at least 35% by 2024.

Since 1994, Mexico has undertaken efforts to increase the use of non-fossil fuel technologies in power generation. Mexico's energy portfolio includes combined-cycle, thermoelectric, geothermal, hydroelectric, coal-fired, solar photovoltaic, wind, turbogas, internal combustion, cogeneration and nuclear power plants. As reported in the 2016-2030 National Power System Development Program (PRODESEN), in 2015, Mexico had 68,044 MW of installed generation capacity and reached a production of 309,553 gigawatt-hours (GWh). Figure 2 shows the participation of each technology to the power generation in Mexico.



Source: SENER, PRODESEN, 2016-2030

During the period of 2016-2030, Mexico plans to increase the use of clean energy by 35,532 MW, including wind, solar, geothermal and hydroelectric resources, among others. With respect to solar energy in particular, CFE began operating its first solar park with 1 megawatt (MW) of installed capacity in Baja California Sur in 2012. Since then, eight more solar plants have been developed in Mexico for a total installed capacity of 56 MW.

In 2015, SENER published the first guidelines and a set of manuals that describe the design principles and operation of the wholesale electricity market. The new scheme includes long-term energy auctions allowing basic suppliers to enter into long-term product purchase agreements under competitive conditions to provide energy (MWh), power capacity (MW) and clean energy certificates (CEL) per CRE requirements.<sup>11</sup>

<sup>11</sup> Source: SENER, PRODESEN 2016-2030.

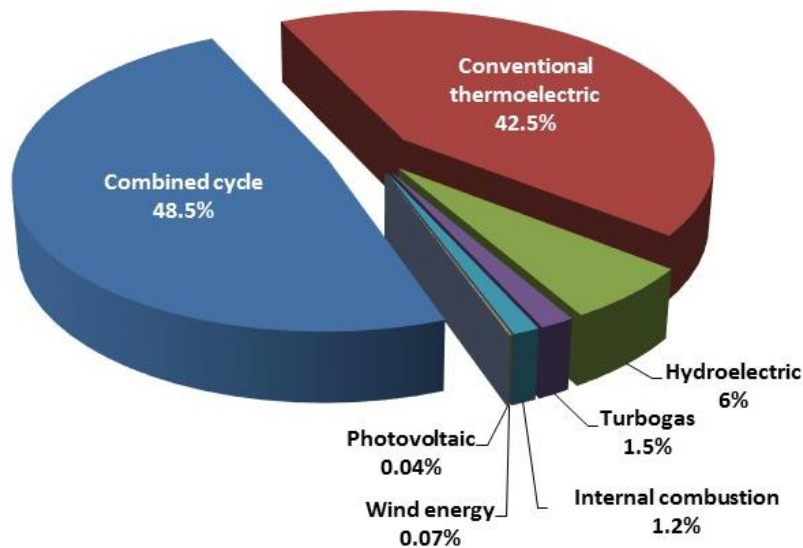


Under the new Power Industry Law in Mexico, a CEL is defined as the certificate issued by SENER to credit the production of a determined amount of energy from clean sources and can be purchased in the wholesale electricity market in Mexico by large electricity consumers, energy suppliers and qualified users in order to meet their renewable energy requirements. One CEL is equivalent to one MWh. The goal is for all participants to obtain at least 5% of their total electricity through CELs by 2018 and 5.8% by 2019.

On May 13, 2016, CENACE published the guidelines for the auction of long-term renewable energy contracts. With CFE as the off-taker, contracts for the purchase of capacity and renewable energy will be for 15 years and contracts for clean energy certificates will be for 20 years. In September 2016, CENACE selected a total of 23 winners out of a pool of 57 eligible bidders to build 2,871 MW of new renewable capacity worth US\$4.0 billion. Component 1 was selected in the auction. It aligns with Mexico’s goals for renewable energy and will represent a significant increase for the solar energy portfolio.

The Project will be located in the Northwest Zone (NWZ), which includes the states of Sonora and Sinaloa. According to SENER, the generation capacity of Sonora was 2,710 MW, supplying 13,569 GWh of electricity in 2015.<sup>12</sup> Figure 3 shows the technologies used for electricity generation in the state.

**Figure 3**  
**SONORA PORTFOLIO OF ENERGY TECHNOLOGIES, 2015**  
 (MW)



Source: Based on PRODESEN 2016-2030.

A detailed description of the technologies used to generate electricity in the state of Sonora for public service is presented in the following table.

<sup>12</sup> Source: idem

**Table 1**  
**POWER GENERATED IN SONORA, 2015**

Technology	MW	Energy Generation (GWh)	% of Energy Generation
Combined cycle	1,315	8,584	79.3%
Conventional thermoelectric	1,153	4,219	18.9%
Hydroelectric	164	705	1.2%
Turbogas	42	0	0.3%
Internal combustion	33	56	0.2%
Wind energy	2	4	0.015%
Photovoltaic	1	1	0.01%
<b>TOTAL</b>	<b>2,710</b>	<b>13,569</b>	<b>100%</b>

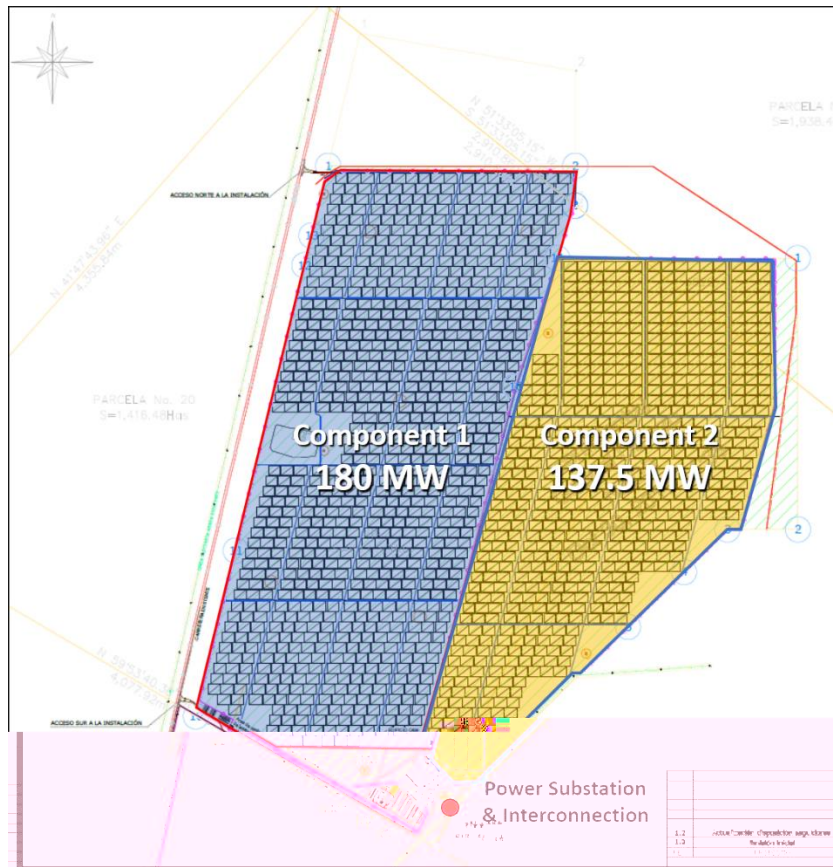
Source: Based on PRODESEN, 2016-2030.

The Project will account for nearly 7% of electricity generation in Sonora and will contribute to diversify the State portfolio which has a high concentration of technologies that required fossil fuels.

**Project Scope and Design**

The proposed Project consists of the design, construction and operation of a 317.5-MWac solar park located in the municipality of Pitiquito, Sonora. The Project will occupy approximately 1,194 hectares (2,905 acres) and is divided into two components: Component 1 with 180 MWac and Component 2 with 137.5 MWac. Figure 4 shows the Project layout.

**Figure 4**  
**PROJECT LAYOUT**



The two Project components include the installation of approximately 1,200,000 solar modules mounted on single-axis tracker arrays and the construction of a collector substation and a switchyard.<sup>13</sup> The energy generated by the Project will be collected through underground lines and delivered to an existing CFE transmission line known as Puerto Libertad-Santa Ana, located 0.2 km (656 feet) from the Project site. The Sponsor is working on the final engineering documents.

The components will have fully-wrapped Engineering, Procurement and Construction (EPC) agreements for the implementation of the Project. NADB procurement policies require that private-sector borrowers use appropriate procurement methods to ensure a sound selection of goods, works and services at fair market prices and that their capital investments are made in a cost-effective manner. As part of its due-diligence process, NADB will review compliance with this policy.

<sup>13</sup>Source: The Sponsor, who continues to evaluate different suppliers and will update the number of modules prior to completion of the Independent Engineer review.

Notice to proceed is scheduled for January 2018, and the Commercial Operation Date (COD) is anticipated to occur no later than June 2019. Table 2 presents the status of key tasks for implementation of the Project.

**Table 2**  
**PROJECT MILESTONES**

Key Milestones	Status	
	Component 1	Component 2
Land lease agreements	Completed January 2017	Completed January 2017
CRE authorizations for energy generation under new legislation	In process. Submitted August 2017 (expected November 2017)	Completed March 2016
Archeological clearance by the National Institute of Anthropology and History (INAH)	Completed January 2017	Completed January 2017
SEMARNAT environmental authorization (MIA resolution)	Completed January 2015	In DTU process. Submitted June 2017 (expected date TBD)
Update SEMARNAT environmental authorization (MIA resolution)	Completed August 2017	N/A
Land use change authorization from SEMARNAT	In process. Submitted May 2017 (expected November 2017)	In DTU process. Submitted June 2017 (expected date TBD)
SENER social impact study	SENER confirmed that Component 1 is not legally bound to present this study (July 2017). However, a social assessment was presented (August 2017).	In process. Submitted July 2017 (expected date TBD)
Power purchase agreements (PPAs)	Completed January 2017	Completed January 2017
CENACE interconnection agreement	In process (expected in November 2017)	In process (expected in November 2017)
Access road authorization from the Sonora State Roadway Board	Completed (October 2017)	N/A
Independent engineer final report	In process (expected date TBD)	In process (expected date TBD)
Commercial operation date (COD)	June 2019	June 2019

DTU stands for “ (Unified Technical Document), a process whereby the Environmental Impact Assessment (MIA) and the Technical Justification Study (ETJ) for the land use change are submitted to SEMARNAT in a single document. N/A = Not applicable; TBD = To be determined.

## 2.1.2. Technical Feasibility

### ***Selected Technology***

The Sponsor is evaluating solar modules from different suppliers in order to select the equipment best suited to the characteristics of the Project site and solar resource. The process for technology evaluation considers elements such as technical performance, commercial offering and

warranties. Additionally, the Project will be evaluated for viability based on the use of cost-effective and reliable technologies. The independent engineer review, required by the lenders, will confirm the suitability of the technology and expected performance. The current technical description of the Project is based on the preliminary engineering provided by the Sponsor, and is subject to change once the design is finalized.

Below is a description of the main components of the Project.

- \_\_\_\_\_: Approximately 1,200,000 photovoltaic modules will be installed and mounted on single-axis tracking arrays. The parallel arrays will be spaced apart to minimize inter-row shading by the sun. The panel providers will be selected from a short list of top-tier global providers.
- \_\_\_\_\_: The Sponsor is currently evaluating equipment specifications based on industry standards, performance efficiency, warranties and prices.
- \_\_\_\_\_: One 34.5/230-kV substation will be constructed to collect the energy through underground lines. The collector substation will step up the energy to 230-kV and will deliver it to the switchyard through a new overhead transmission line extending 0.2 km (656 ft.). The Project will be interconnected to the CFE national grid through the Puerto Libertad-Santa Ana Transmission Line, which has sufficient capacity to convey the energy generated by this Project.
- \_\_\_\_\_: A SCADA system will be used to monitor, operate and track the plant remotely, as well as document the performance of the PV system relative to its predicted output.
- \_\_\_\_\_: Access roads will be constructed to allow for the delivery and installation of the components, machinery, equipment and materials required for construction of the modules, substation and switchyard, as well as for operation and maintenance of the facilities. The roads will be designed for low-volume traffic.
- \_\_\_\_\_: A permanent O&M facility will be built with administrative space, as well as for the maintenance and storage of equipment during construction and operation.

### **Solar Resource Assessment**

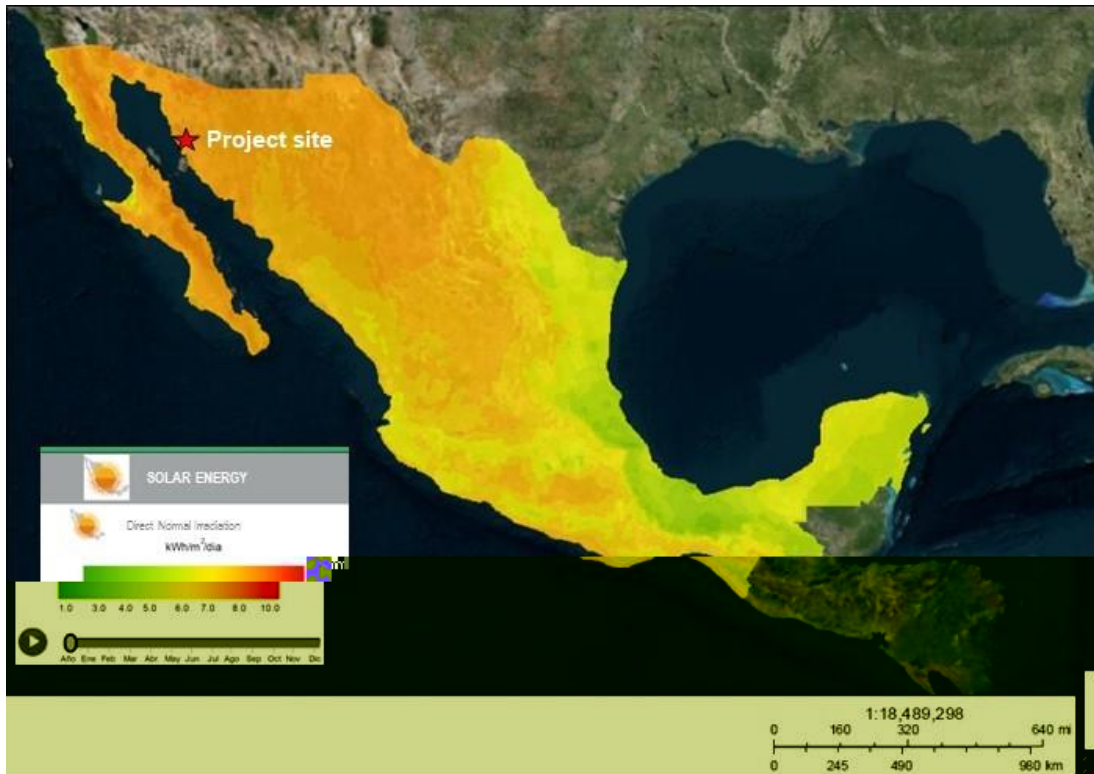
The Project is located in the municipality of Pitiquito in the state of Sonora, where optimum solar resource has been reported. According to the Mexican National Renewable Energy Inventory (INERE) published by SENER, solar resources at the Project site range from 7,000 to 8000 W/m<sup>2</sup> (see Figure 5).<sup>14</sup>

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<sup>14</sup> Source: SENER, Mexican National Renewable Energy Inventory, (<https://dgel.energia.gob.mx/inere/>).

(INERE)

**Figure 5**  
**SOLAR RESOURCE IN MEXICO**



Source: National Renewable Energy Inventory (INERE)

The northwest region of Mexico is one of the areas with highest solar energy resource in the world. Based on the solar resource assessments developed by SENER, Sonora has a high potential for solar energy development. Solar resources in the state are estimated at 2,600 GWh/year, which is equivalent to 8.39% of national solar potential. Solar irradiation in the state is 45% higher than the national average, mainly in the northern area of the state. The Sonora State Development Plan promotes the use of renewable energy sources to help create new jobs, foster innovation and reduce the release of harmful emissions into the environment.<sup>15</sup>

A solar monitoring station was installed in the Project site by the Sponsor to evaluate the solar resource and is currently in operation. Also, the Sponsor is currently evaluating module technology that is expected to be mounted on single-axis trackers and will update the electricity generation models as soon as the technology is confirmed. This information will be evaluated during the independent engineer review, in coordination with NADB.

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<sup>15</sup> Source: Sonora State Development Plan (2016-2021).

### **2.1.3. Land Acquisition and Right-of-way Requirements**

The Project will be developed in the municipality of Pitiquito in a region identified as the Sonora Desert with desert vegetation. The land has been used for agriculture and hunting.<sup>16</sup>

The Project will be built on 1,194 hectares (2,950 acres), that have been secured through a 20-year lease agreement with a private landowner in January 2017. The lease agreement includes the rights of way to use the land to construct the access roads, collector substation and infrastructure necessary to interconnect the Project to the national grid. The independent engineer and legal advisor will review the lease agreement documents prior to loan disbursement.

Land use change authorizations from the Ministry of Environment and Natural Resources (SEMARNAT) will be required for construction of the Project. Authorization for a land use change for Component 1 was requested by the Sponsor in May 2017 and is expected to be approved by SEMARNAT in November 2017. In the case of Component 2, the Sponsor submitted a single document to SEMARNAT containing both the Environmental Impact Assessment (MIA) and the Technical Justification Study (ETJ) required for land use change authorization. More information is provided in Section 2.2.

Municipal permits for construction will be obtained prior to initiating construction. Obtaining the appropriate permits and authorizations as Project construction advances will be a requirement for loan disbursement.

### **2.1.4. Management and Operations**

The Sponsor, a joint venture between BioFields and Acciona, will use two special-purpose vehicles, AT Solar V, S. de R.L. de C.V. and Tuto Energy II, S.A.P.I. de C.V., to develop the Project in Sonora, Mexico.

BioFields is a Mexican company focused on agroindustry, renewable energy and financing services. BioFields established strategic alliance with Acciona, a worldwide company dedicated to energy and public infrastructure developments.

Acciona has extensive experience in the renewable energy sector, including wind, solar photovoltaic, solar thermal, hydroelectric and biomass. The company has developed several solar energy projects around the world with a total capacity of 501.7 MW.<sup>17</sup> Also, since 2009, the company has developed wind energy projects in Mexico with a total capacity of more than 557 MW in the states of Oaxaca and Nuevo Leon.

The proposed Project will be designed to operate with minimal human intervention. Operation and maintenance tasks will be performed to optimize the operating times of the modules, reduce repair costs and extend the life of the equipment. The expected useful life of the Project is 50

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<sup>16</sup> Source: MIA Resolution for a 180-MWac solar park.

<sup>17</sup> Source: Information provided by the Sponsor.

years.<sup>18</sup> The Sponsor will execute two Operation and Maintenance Agreements, which in addition to the engineering, procurement and construction of the Project, will cover the first two years of operation. Typical operation and maintenance for single-axis solar fields includes cleaning solar modules and preventive maintenance of equipment.

## 2.2. ENVIRONMENTAL CRITERIA

### 2.2.1. Compliance with Applicable Environmental Laws and Regulations

#### Applicable laws and regulations

According to the MIA Resolution for Component 1 issued by SEMARNAT in January 2015, the Project must comply with the following laws:

- \_\_\_\_\_, which establishes the environmental regulatory framework, expands the strategic vision, and conveys specific powers and duties to the states and municipalities, so that the environmental problems of each can be addressed directly. In accordance with Articles 28 and 30 of this law, the Project Sponsor developed a MIA that includes mitigation measures to preserve and protect the environment.
- \_\_\_\_\_, which regulates and promotes the conservation, protection, restoration, production, zoning, cultivation, management and use of the country's forest ecosystems and their resources. In accordance with the provisions of Article 7, sections XL and XLV, of this law, the Project Sponsor must obtain the corresponding Forest Land Use Change Permit.
- \_\_\_\_\_ which establishes the maximum permissible levels of pollutants emitted by vehicles using gasoline as fuel.
- \_\_\_\_\_ which establishes the maximum permissible levels of exhaust fume opacity from vehicles that use diesel, as well as test procedures and technical characteristics of measuring equipment.
- \_\_\_\_\_ which establishes the characteristics, identification procedures and classification of hazardous solid waste.
- \_\_\_\_\_ which identifies and lists endangered species or clusters of wildlife in Mexico and establishes the criteria for inclusion, exclusion or change in risk status for different species, based on a method for assessing the risk of extinction.
- \_\_\_\_\_, which establishes the maximum permissible noise levels of exhaust systems of motor vehicles, motorcycles and three-wheel motor vehicles, as well as noise measuring methods.
- \_\_\_\_\_, which establishes the maximum levels of noise from stationary sources and noise measuring methods.

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<sup>18</sup> Source: MIA Resolution for a 180-MWac solar park.



**Environmental Studies and Compliance Activities**

In accordance with the environmental impact regulations established under the LGEEPA, the Sponsor prepared and submitted the following environmental documents:

- MIA assessment for the construction of a 180-MWac solar park and related infrastructure (Component 1), submitted on August 5, 2014;
- Update of the MIA assessment for the construction of a 180-MWac solar park and related infrastructure (Component 1), submitted on July 10, 2015;
- Land use change application for the 180-MWac solar park (Component 1), submitted in May 2017; and
- MIA assessment and technical justification study for the construction of a 137.5-MWac solar park and related infrastructure (Component 2), submitted on June 27, 2017.

The MIAs for Components 1 and 2 identified, described and evaluated the potential

### **Pending Environmental Tasks and Authorizations**

The following documentation is pending:

- Authorization of the MIA for construction of a 137.5-MWac solar park and related infrastructure (Component 2);
- SEMARNAT Forest Land Use Change Authorization for the 180-MWac solar park (Component 1); and
- SEMARNAT Forest Land Use Change Authorization for the 137.5-MWac solar park (Component 2).

NADB intends to participate in both components of the Project. Nevertheless, if the MIA resolution from SEMARNAT for Component 2 is still pending at the time of Project funding, NADB financing will be allocated exclusively to Component 1.

### **2.2.2. Environmental Effects / Impacts**

There is a need for affordable and environmentally-friendly alternatives to conventional hydrocarbon-based energy resources. Renewable energy projects create an opportunity to generate electricity utilizing sources that do not produce greenhouse gases (GHG) and criteria pollutants (SO<sub>2</sub>, NO<sub>x</sub>, etc.) like those released by fossil-fuel-based plants. Sunlight is a source of renewable energy, which means that it can be used continuously without depleting natural resources. It is a clean form of renewable energy as no waste or pollutants are released in the generation process and, therefore, it provides an opportunity to prevent the emission of GHG and other pollutants produced by traditional hydrocarbon-based energy generation, while providing local residents with a safe and reliable energy alternative. Moreover, solar energy production does not consume or pollute water, although minimal amounts may be used for maintenance purposes. Solar energy is currently used in many developed and developing nations to meet their demand for electricity.

### **Existing Conditions and Project Impact – Environment**

Historically, Mexico has depended to a great extent on fossil fuels for the generation of energy. This conventional method of energy development can affect the natural environment due to harmful emissions related to the generation process, including GHG and other criteria pollutants, such as SO<sub>2</sub> and NO<sub>x</sub>.

The Project will help reduce future demand for electricity generated by fossil fuel-based power plants and, in the process, will help reduce harmful emissions. The anticipated environmental outcomes from the installation of 317.5 MWac of new renewable energy generation capacity (or

an average of 961.55 GWh of electricity a year), include the reduction of approximately 440,390 metric tons/year of CO<sub>2</sub>e.<sup>19</sup>

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Some environmental impacts are anticipated from the implementation of the Project. The Sponsor has proposed measures that are intended to reduce, mitigate and control environmental impacts resulting from Project activities. To ensure that mitigation measures are implemented properly and in a timely manner, the Sponsor will develop the Environmental Monitoring Plan described in the MIA resolution for Component 1. The following mitigation measures included in the MIA and its resolution for the 180-MWac solar park (Component 1) will be implemented.

- \_\_\_\_\_:
  - Compliance with the guidelines and criteria established in the Sonora Coast Environmental Land Management Program,
  - Specialized personnel with environmental expertise will develop and implement the Environmental Monitoring Plan in compliance with the condition and terms of the resolution.
  - All control, prevention and mitigation measures proposed in the MIA will be performed, and the conditions and terms of the MIA resolution will be met.
  
- \_\_\_\_\_:
  - Reforestation Plan will be implemented considering the impact of the vegetation loss.
  - Six months prior to the construction activities, any species of flora protected under Mexican standard NOM-059-SEMARNAT-2010 will be identified, and steps will be taken to ensure no species are harmed during any phase of the Project.
  - The land use change authorization will be obtained, and the corresponding compensation program will be implemented.
  - Vegetation removed from the Project area will be properly transported to a final disposal site authorized by the municipality.
  - Soil Management and Restoration Plan will be implemented, which includes measures for soil conservation and/or erosion control.

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<sup>19</sup> NADB's CO<sub>2</sub>e calculation is based on the potential emissions avoided as a result of reducing future demand on fossil fuel-based electricity through the use of solar energy generation equivalent to 961.55 GWh/year. Typically, NADB's CO<sub>2</sub>e calculations are based on emission factors from an energy generation facility close to the Project area, which in this case would be the Puerto Libertad thermoelectric plant recently converted to natural gas. However, its emission factors are not publicly available; therefore, the CO<sub>2</sub>e calculation was based on the national emission factor. National emission factors for SO<sub>2</sub> and NO<sub>x</sub> are not available and, thus, are not considered in the results measurement scheme for this Project, although it is expected the Project will help to reduce the emission of other pollutants.

- \_\_\_\_\_:
  - Prior to initiating site preparation activities, wildlife will be removed from the area to avoid impacts to any specimens.
  - Prior to land clearing activities, the Sponsor will verify the existence of any fauna protected under Mexican NOM-059-SEMARNAT-2010. If detected, the Sponsor will rescue and relocate the specimens to a similar site with the concurrence of the environmental authorities.
  - Wildlife hunting, trapping and trafficking will be officially prohibited.
  
- \_\_\_\_\_:
  - During site preparation and construction, Project activities will comply with the provisions of Mexican standard NOM-081-SEMARNAT-1994, which establishes the maximum levels of noise from stationary sources and noise measuring methods.
  - To minimize noise emissions, all vehicles will be appropriately maintained and tuned up.
  
- \_\_\_\_\_: Construction materials and waste transported by heavy vehicles will be covered and dampened.
  
- \_\_\_\_\_:
  - A Wastewater Management Plan will be implemented during the construction phase in compliance with the applicable regulations.
  - During site preparation, sanitary services for handling and disposing of wastewater will be performed by a specialized company in accordance with applicable regulations.
  - A Water Management Plan will be implemented.
  
- \_\_\_\_\_:
  - Oils, fuels and other pollutants will not be placed directly on the ground during any stage of Project development or operation.
  - Procedures will be implemented for the separation, storage, collection and use or disposal of the different types of waste generated in the different stages of the Project.
  - Solid waste will be handled in accordance with SEMARNAT regulations.

Similar measures to those described above are anticipated for Component 2, once its MIA is approved.

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The Project will support natural resource conservation by reducing the demand on fossil fuels for energy production and providing related improvements to air quality. The Project is anticipated

to produce an approximately of 961.55 GWh of zero-carbon electricity during the first year of operation, equivalent to the annual energy consumption of approximately 132,554 households.

In addition, clean technologies such as solar energy require no water for electricity production, whereas fossil-fuel-fired generation is typically water intensive. Water to be used during the construction and operation phase, will be transported by water tanks to the Project site.

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The “no action” alternative to the development of renewable energy sources would result in greater demand for conventional fossil-fuel-based energy production, further depleting natural resources for the purpose of meeting an ever-growing demand for energy, as well as a lost opportunity to generate emission-free energy, such as that derived from solar sources. Moreover, the Project will help meet the goals related to emissions reduction, while also helping to meet increased demand for electricity. Should the Project not be implemented, the mix of renewables in Mexico’s energy portfolio will be delayed.

***Existing Conditions and Project Impact – Health***

Epidemiological research has shown that both chronic and acute exposure to harmful emissions associated with fossil fuel-based energy production can lead to serious respiratory problems. It is estimated that, at the very least, prolonged exposure to excessive levels of pollutants can deteriorate the respiratory capacity of human beings and greatly contribute to the increased incidence of cardiopulmonary diseases, such as asthma, heart ailments, and lung cancer.

By using clean renewable resources instead of conventional fossil fuel sources in power generation, the Project will help reduce pollutants associated with the fossil fuel based energy production and thus help to contain the severity of respiratory problems and other diseases aggravated or caused by air pollution. In addition, the reduction of GHG emissions is expected to mitigate climate effects that create more vulnerable conditions for human health.

***Transboundary Effects***

No transboundary impacts are anticipated as a result of the development of the Project, given its distance from the border. However, the Project will aid in addressing the larger environmental concerns related to greenhouse gases and global warming targeted by international agendas and will be consistent with the North American Climate, Clean Energy, and Environment Partnership Action Plan announced by the governments of the U.S., Mexico and Canada on June 29, 2016.

***Other Local Benefits***

The Project will promote the social and economic development of the municipality of Pitiquito, Sonora, and is expected to generate approximately 500 temporary jobs during construction, as well as close to 50 permanent jobs during operation. Employment of construction personnel will provide a temporary beneficial impact on local businesses and the regional economy through increased expenditure of wages for goods and services. Personnel for construction will be drawn from local communities to the extent feasible.

### **2.3. FINANCIAL CRITERIA**

The Project Sponsors have requested a loan from the North American Development Bank (NADB) to complete the financing of the Project. The proposed payment mechanism is consistent with the project structures currently seen in the Mexican renewable energy industry. The source of payment will be the revenues generated by the Project in accordance with long term Power Purchase Agreements (PPAs) with CFE and a private off-taker, and some additional sales in the spot market. NADB loan will have no recourse beyond the Project Companies.

NADB performed a financial analysis of the sources of payment; the proposed payment structure; and the Project's cash flow projections over the term of the loan. The Project's expected revenue from the sale of electricity, energy certificates and capacity, is estimated to be sufficient to: a) cover scheduled O&M expenses, b) fund any debt service reserve, c) pay the debt service on the senior loan, and d) comply with debt service coverage requirements.

In addition, NADB's analysis verified that the Borrower has the legal authority to contract financing and pledge its revenue for the payment of financial obligations. The Borrower also has the legal and financial capacity to operate and maintain the Project, and will contract the Project's O&M services with a firm with ample experience and expertise in these types of projects. NADB has verified that the projected O&M costs are in accordance with industry standards.

Considering the Project's characteristics and based on the financial and risk analyses performed, the proposed Project is considered financially feasible and presents an acceptable level of risk. Therefore, NADB proposes providing a market-rate loan for up to US\$75 million for the construction of the Project described herein.

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### 3. PUBLIC ACCESS TO INFORMATION

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#### 3.1. PUBLIC CONSULTATION

The draft project certification and financing proposal was released for a 30-day public comment period beginning August 2, 2017. The following documentation was made available upon request:

- MIA assessment for the construction of the 180-MWac solar park and related infrastructure (Component 1), submitted on August 5, 2014;
- MIA Resolution No. SGPA/DGIRA/DG00640 for the 180-MWac solar park (Component 1); and
- Archeological Clearance No. 401.3S.4.2-2017/071 issued by the National Institute of Anthropology and History (INAH) for the 180-MWac solar park.

The public comment period ended on September 1, 2017, with no comments received.

#### 3.2. OUTREACH ACTIVITIES

As part of the environmental authorization process, on August 7, 2014, SEMARNAT published the request for environmental authorization of the 180 MWac solar park (Component 1) in its weekly publication ( ), which provides information about the projects under evaluation. The ruling did not report any public comments received. On August 8, 2014, the Sponsor published an extract of the MIA for the Project under review by SEMARNAT in the newspaper, in Hermosillo, Sonora.

##### **Social Impact Evaluation**

Under the Mexican Power Industry Law, anyone interested in obtaining a permit or authorization to develop projects in the energy sector must present a Social Impact Assessment (SIA) to SENER. In accordance with the guidelines and methodologies established by SENER, the study must identify the communities and towns in the area of influence of a project, as well as identify, characterize, predict and assess its possible consequences for the population, along with mitigation measures and plans for managing the social aspects of the project, including: a Social Management Plan (SMP), Social Investment Plan (SIP), Monitoring and Evaluation Plan, Communication Strategy and Community Involvement Plan, social baseline, and stakeholder analysis. The evaluation also requires that indigenous communities or groups be identified in the area of influence of the project to determine if they need to be consulted. Based on the assessment, SENER will verify compliance with social impact and sustainable development regulations.

In July 2017, the Sponsor obtained an opinion from SENER confirming that the SIA for the 180-MWac solar park (Component 1) is not required, since its permit was obtained prior the release of the new law. In the case of the 317.5-MWac solar park (Component 2), the Sponsor submitted the SIA in July 2017 in compliance with the law. The SIA Resolution from SENER for Component 2

is still pending. The information obtained from the process to comply with SENER requirements will be reviewed by the Environmental and Social Advisor prior to disbursement.

### **Media Search**

NADB conducted a media search to identify potential public opinion about the Project. References to the Project were found on several Internet sites, such as

. These articles can be found at the following links:

- \_\_\_\_\_ (October 10, 2016) –  
(Acciona to invest US\$400 million in a solar park in Sonora)  
<http://www.elfinanciero.com.mx/economia/accion-a-invertira-400-mdd-en-planta-solar-en-sonora.html>
- \_\_\_\_\_ (October 31, 2016) – \_\_\_\_\_ (Acciona  
is doing business with the sun in Sonora)  
<https://www.forbes.com.mx/accion-a-hace-negocio-con-el-sol-en-sonora/>
- \_\_\_\_\_ (November 1, 2016) –  
(Acciona to invest US\$400 million in a solar park in Puerto Libertad)  
<http://www.infomaquila.com/accion-a-invertira-400-mdd-en-planta-solar-en-sonora/>
- \_\_\_\_\_ (February 7, 2017) – “ \_\_\_\_\_ (Acciona  
expands solar Project in Sonora)  
<http://www.elnorte.com/aplicacioneslibre/articulo/default.aspx?id=1040718&md5=5336332d1e22f10b0e9c39e54f001f7d&ta=0dfdbac11765226904c16cb9ad1b2efe&po=4>
- \_\_\_\_\_ (February 7, 2017) – “  
\_\_\_\_\_” (Puerto Libertad photovoltaic plant in Sonora to be the largest in  
the country) <http://www.expreso.com.mx/seccion/sonora/8452-la-central-fotovoltaica-de-puerto-libertad-sera-la-mas-grande-del-pais.html>
- \_\_\_\_\_ (February 21, 2017) – “ \_\_\_\_\_” (Energy Will be firing up  
in Sonora) <https://elimparcial.com/Columnas/DetalleColumnas/1185912-Efecto-multiplicador-Javier-Villegas-Orpinela.html>
- \_\_\_\_\_ (April 3, 2017) – “  
\_\_\_\_\_” (Governor announces million dollar energy investment)  
<http://diariodelyaqui.mx/2017/04/03/anuncia-gobernadora-millonaria-inversion-energetica/>

In summary, these publications highlighted the scope of the Project. No opposition to the Project was detected in the available media coverage. The Project Sponsor has followed all public consultation requirements in order to comply with applicable environmental clearance and permitting processes.