

**Overseas Private Investment
Corporation
Environmental Guidance
Renewable Energy – Solar Projects**

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Acknowledgements

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Overseas Private Investment Corporation

Environmental Guidance

Renewable Energy – Solar Projects

Section 1.0 - Introduction

1.1 Project Definition

These guidelines address evaluation features most significant to solar photovoltaic (PV) projects, both utility scale central generating facilities and stand-alone units. PV technologies convert energy from sunlight directly into electricity, using large arrays of solar cells electrically connected and encapsulated as modules. The modules often have a sheet of glass on the front, which allows light to pass through while protecting the semiconductor wafers from natural elements such as abrasion and impacts due to debris, rain, or hail. In large-scale installations the electricity produced by the modules is usually fed into the electrical grid using inverters. Stand-alone solar photovoltaic systems often use batteries to store energy on-site.

Photovoltaic modules are typically made from monocrystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide/sulfide. While cadmium present in the cadmium telluride cells would be toxic if released, the quantity of cadmium present in the cells is typically small, stable and poses little threat; however, the cadmium does pose some issues for disposal of the units at the end of their lifetime.

The scope of solar PV projects also includes any associated infrastructure or ancillary facilities associated with the Project, including those that are not funded as part of the Project (funding may be provided separately), but whose viability and existence depend exclusively on the Project, and whose goods and services are essential for the successful operation of the Project. These may include pipelines, power transmission lines, access roads, and temporary-worker housing.

1.2 Summary of Significant Issues

These guidelines discuss the evaluation features most significant to solar PV projects and reflect the information contained in the International Finance Corporation's General Environmental, Health and Safety Guidelines and Performance Standards and other relevant standards and guidelines. These features include:

- Presence of critical or sensitive habitat on or adjacent to the site.
- Socio-cultural issues.
- Visual impacts, particularly if the installation is located near residential developments.
- Disposal of the modules at the end of their lifetime.
- Impacts related to the construction of ancillary facilities including access roads and power transmission lines.
- Cumulative effects.

1.3 Scope of the Guidelines

These guidelines present potential environmental and social issues associated with solar PV energy projects, how OPIC may consider each of these issues when screening projects, applicable guidelines and standards, recommended measures to mitigate impacts, information needed to review a project and monitoring recommendations.

These guidelines discuss the evaluation features that, in general, are most significant with respect to solar energy projects and therefore require more emphasis while conducting environmental and social due diligence. As each project is unique, these guidelines may not capture the complete set of environmental and social issues related to solar projects. Each project is distinct and therefore will have environmental and social issues associated exclusively with that particular project.

This guidance document is restricted to the review of solar PV projects either for the construction of utility scale solar photovoltaic projects or smaller solar stand-alone installations. Concentrated solar projects, which use various techniques to track the sun and focus light to heat a fluid which then is used for thermal power generation, are not included as a part of these guidelines, although the siting issues would be similar. These guidelines also do not address impacts related to the manufacturing of solar modules.

It should be noted that these guidelines do not discuss typical impacts from construction and civil works such as erosion, impacts to water quality, solid waste disposal and occupational health and safety issues. For additional guidance on these matters, please refer to IFC's General Environmental, Health, and Safety Guidelines, Section 2.0: Standards and Guidelines (2007).

Section 2.0 - Standards and Guidelines

In addition to applicable host country requirements, solar PV projects are assessed using the following criteria:

- **OPIC's Environmental and Social Policy Statement (2011).**
http://www.opic.gov/sites/default/files/consolidated_esps.pdf
- **International Finance Corporation's (IFC) Performance Standards on Social and Environmental Sustainability (2012).**
<http://www.ifc.org/ifcext/policyreview.nsf/Content/2012-Edition-PerformanceStandards>
- Applicable provisions of **IFC's General Environmental Health and Safety Guidelines**, including the following:
 1. **Environment**
 - Section 1.1 Air Emissions and Ambient Air Quality
 - Fugitive Sources
 - Mobile Sources - Land-Based
 - Section 1.3 Wastewater and Ambient Water Quality
 - Section 1.6 Waste Management
 - Section 1.7 Noise
 2. **Occupational Health and Safety**
 - Section 2.1 General Facility Design and Operation
 - Section 2.2 Communication and Training
 - Section 2.3 Physical Hazards
 - Section 2.7 Personal Protective Equipment
 - Section 2.9 Monitoring
 3. **Community Health and Safety**
 - Section 3.2 Structural Safety of Project Infrastructure
 - Section 3.4 Traffic Safety
 - Section 3.7 Emergency Preparedness and Response
 4. **Construction and Decommissioning**
 - Section 4.1 Environment
 - Section 4.2 Occupational Health and Safety
 - Section 4.3 Community Health and Safety

[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/\\$FILE/Final+-+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf)

Other guidelines relevant to ancillary infrastructure include applicable provisions of:

- **IFC's Environmental, Health and Safety Guidelines for Electrical Power and Distribution.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ElectricTransmission/\\$FILE/Final+-+Electric+Transmission+and+Distribution.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ElectricTransmission/$FILE/Final+-+Electric+Transmission+and+Distribution.pdf)
- **IFC's Environmental Health and Safety Guidelines for Toll Roads.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_TollRoads/\\$FILE/Final+-+Toll+Roads.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_TollRoads/$FILE/Final+-+Toll+Roads.pdf)
- **Workers' Accommodation: Processes and Standards: A Guidance Note by IFC and the EBRD.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_WorkersAccommodation/\\$FILE/workers_accomodation.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_WorkersAccommodation/$FILE/workers_accomodation.pdf)

Note: International organizations, the United States Government and Industry groups periodically revise guidelines and standards to reflect technological advances and improved understanding of environmental, health, safety, and social risks. Completed applications that are received before the effective date of a new guideline or standard will be assessed using the guideline or standard that is in effect on the date of application, provided OPIC commitment for support is achieved within one year of the effective date of the new guideline or standard. If commitment is not achieved within one year after the effective date of the new guideline, the Project will be subject to the new guideline.

Section 3.0 - Screening

Based on information received from the Project applicant for the purposes of environmental, social, health and safety review, OPIC screens projects into one of three categories: Categorically Prohibited, Category A, and Category B.

3.1 Categorically Prohibited

Solar PV projects can result in adverse impacts and land disturbances that may preclude OPIC support. Project location is the primary determinant of eligibility. OPIC will not support the following types of projects:

- Projects that involve conversion or degradation of Critical Forest Areas or forest-related Critical Natural Habitats.
- Projects that require resettlement of 5,000 or more persons.
- Projects in or impacting natural World Heritage Sites (<http://whc.unesco.org/en/list>) unless it can be demonstrated through an environmental assessment that the Project (i) will not result in the degradation of the protected area and (ii) will produce positive environmental and social benefits.
- Projects in or impacting areas on the United Nations List of National Parks and Protected Areas (http://www.unep-wcmc.org/un-list-of-protected-areas_269.html) unless it can be demonstrated through an environmental assessment that the Project (i) will not result in the degradation of the protected area and (ii) will produce positive environmental and social benefits.
- Extraction or infrastructure projects in or impacting: protected area Categories I, II, III, and IV (Strict Nature Reserve/Wilderness Areas and National Parks, Natural Monuments and Habitat/Species Management Areas), as defined by the International Union for the Conservation of Nature (IUCN). Projects in IUCN Categories V (Protected Landscape/Seascape) and VI (Managed Resource Protected Area) must be consistent with IUCN management objectives (http://www.iucn.org/about/work/programmes/pa/pa_products/wcpa_categories/) (http://www.iucn.org/about/work/programmes/species/red_list/) unless it can be demonstrated through an environmental assessment that the Project (i) will not result in the degradation of the protected area and (ii) will produce positive environmental and social benefits.

If not prohibited, then the solar PV project is further screened as either Category A or Category B.

3.2 Category A or Category B

Category A solar PV projects are likely to have significant adverse environmental and social impacts that are irreversible, sensitive, diverse or unprecedented. Category A projects require submission of an Environmental and Social Impact Assessment (ESIA) developed in accordance with IFC P.S. 1, an on-site due-diligence visit by an OPIC environmental analyst or a third-party consultant approved by OPIC and development and implementation of an Environmental and Social Action Plan (ESAP). Within three years of the execution of the contract with OPIC, Category A projects are required to conduct a third party audit.

Issues that require careful consideration in determining whether a project is Category A or B for solar PV projects include the following:

- Potential for significant habitat alteration or wildlife disturbance, including disruption of wildlife migration corridors.
- Potential for significant socio-cultural impacts related to land acquisition, land use, indigenous peoples, and cultural heritage
- Potential for significant environmental and social impacts from ancillary features.
- Potential for significant environmental and social impacts due to cumulative effects.

If a project originally screened as a Category A is subsequently found to result in major or unreasonable adverse environmental, social, health or safety impacts, OPIC may decide to decline support.

Advanced planning in siting may be used to avoid or significantly reduce adverse impacts of solar PV projects. A solar PV project may be screened as Category B if significant impacts are avoided, adequately mitigated and sufficient information is provided to assess such impacts, and there is no significant opposition to the Project by local stakeholders.

Section 4.0 - Significant Issues and Applicable Guidelines and Standards

This section describes environmental and social evaluation features associated with solar PV projects, how each of these features may affect screening determinations, and measures to mitigate impacts as provided in applicable guidelines and standards.

4.1 Presence of Critical or Sensitive Habitat on or Adjacent to the Site

Description of Impact. Solar PV projects use large amounts of land (typically at least five acres per MW); however, the exact amount depends on location and type of technology employed. Impacts to habitat due to siting of solar energy projects also vary according to location and size of the Project, but may present the potential for significant impacts to wildlife and vegetation given the large tracts of land needed for the Projects. Long-term displacement and fragmentation of habitat may occur as a result of the installation of the solar array itself, construction of access roads, and power transmission line construction.

The natural areas where solar projects are to be sited could be adversely impacted in the short-term from sedimentation and erosion caused during construction of the facilities themselves as well as by the construction of ancillary facilities such as transmission lines and roads. Often specific regions can have more than one solar array proposed and cumulative impacts to wildlife and vegetation need to be considered. Indicators of the potential presence of critical habitats that can affect categorization include the presence of wetlands or known wildlife breeding or nesting areas. The presence of limited range endemic species may also be a strong indicator of a critical habitat.

Screening. OPIC cannot support projects that involve conversion or degradation of Critical Forest Areas or forest-related Critical Natural Habitats or projects located in or adversely impacting internationally recognized protected areas unless it can be demonstrated through an environmental assessment that the Project (i) will not result in the degradation of the protected area, and (ii) will produce positive environmental and social benefits.

Projects that are not located in forest-related Critical Natural Habitats or Critical Forest Areas but that have the potential to result in significant habitat alteration or wildlife disturbance, including disruption of wildlife migration corridors, may be classified as Category A. The extent of impact and species located in or near the habitat or corridors are considered in determining the classification of the Project.

Impact mitigation. The installation of a solar PV facility often results in long-term land use alterations and the most effective means of limiting any impacts to sensitive habitats is to avoid them. This involves siting facilities outside of any environmentally sensitive areas. Examples of recommended mitigation measures include:

- Siting to avoid critical terrestrial and aquatic habitat.
- Designing and constructing wildlife access to avoid or minimize habitat fragmentation.
- Avoiding or modifying construction activities during breeding or other sensitive seasons.
- Minimizing removal of native plant species and replanting of native plant species in disturbed areas.

4.2 Socio-cultural issues

4.2.1 Land Acquisition and Land Use

Description of Impact. Solar PV projects can involve large tracks of land and therefore significant land acquisition. Any project involving land acquisition can impact local communities and their livelihoods, current landowners and/or current land users. Land acquisition that results in involuntary resettlement can complicate the social impact of the Project. This is compounded when projects are located in countries where land tenure and ownership laws are tenuous and/or in situations where local communities or groups do not hold title to the land.

Solar projects impacting large amounts of agricultural land could have particularly significant impacts on people's livelihoods and raise issues related to the substitution of fuel for food.

Screening. Land acquisition procedures, physical or economic displacement of people and/or impacts on their livelihood, and changes in land use are factors considered in screening projects as Category A or B. Information regarding actual land ownership, and in some countries, past ownership, as well as existing and adjacent land use, can assist in determining if effects in this area would result in a Category A or B classification. Projects involving significant resettlement or impacts on livelihoods due to changes in land use are likely to be screened as Category A.

Impact Mitigation. Land should be acquired on a voluntary basis with current landowners and tenants and prices should be negotiated with current owners at market rates. For projects that involve involuntary physical or economic displacement, land must be acquired in accordance with IFC's Performance Standard 5 (Land Acquisition and Involuntary Resettlement) and, where indigenous peoples are involved, IFC's Performance Standard 7 (Indigenous Peoples). The resettlement, compensation and community consultation processes, and agreements must be clearly documented.

Land use patterns should be assessed to determine if there are current existing land uses, such as agriculture or tourism that could be diminished as a result of the establishment of a solar PV project.

4.2.2 Indigenous Peoples and Cultural Heritage

Description of Impact. Indigenous people may be particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs and institutions may also come under threat.

Projects may be located in an area with the potential for containing tangible cultural resources. In addition, a solar project may impact the cultural heritage of the area by changing the landscape and possibly the type of economic activity in the area (IFC, 2006).

Screening. Projects with the potential to adversely impact indigenous peoples are sensitive and as such are more likely to be screened as Category A. Projects with the potential to affect cultural heritage may be screened as Category A if impacts are determined to be significant.

Impact Mitigation. Projects should anticipate and avoid adverse impacts on communities of indigenous peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. For additional information on standards and requirements related to impacts on indigenous peoples, consult IFC's P.S. 7.

If a solar project has the potential to impact cultural resources, either tangible or intangible, mitigation measures found in IFC P.S. 8 should be implemented.

4.3 Community Issues

4.3.1 Visual Impacts

Description of Impact. Visual impacts associated with solar PV projects typically concern the appearance of the solar modules and their interference with the character of the surrounding landscape, particularly to nearby residential communities. Additionally, sometimes reflection from the module surfaces exacerbates visual impacts from a project. Consideration should be given to the landscape character during siting and visual impacts from relevant viewing angles.

Screening. If opposition to a project develops, the level of opposition can affect a project's classification as Category A or Category B.

Impact Mitigation. The IFC guidelines recommend consideration of the landscape character during siting and evaluation of visual impacts from relevant viewing angles. Specific assessment from critical viewsheds with renderings is appropriate. Ancillary structures such as fencing and on-site roads should be minimized, steep slopes avoided, erosion control measures, and revegetation procedures implemented.

4.4 Panel Disposal

Description of Impact. While solar modules can last up to thirty years, a significant quantity of material needs to be disposed of at the end of the life of the modules. Because modules can contain potentially hazardous materials and many countries where OPIC projects are located lack adequate disposal facilities, consideration should be given at the start of a solar PV project as to how units will be disposed of at the end of their useful life. Additionally, projects with battery storage must address disposal of batteries at the end of their useful life.

Screening. Impacts with respect to panel disposal can be mitigated to acceptable levels as long as adequate consideration is given to the issue at the developmental stage of the Project. Implementation of appropriate mitigation measures with respect to panel disposal would assist in screening the Project as Category B.

Impact Mitigation. Project developers should consider ultimate disposal options at the start of the Project and devise plans. Many components of photovoltaic modules are recyclable and some solar module manufacturers provide recycling of the panels with purchase. Recycling will greatly reduce potential adverse impacts associated with panel disposal.

4.5 Ancillary Facilities

Description of Impact. Ancillary features, including access roads and power transmission lines to connect a project to an existing electrical grid, can result in significant land use disturbances, visual intrusions, and wildlife impacts. In addition, because sites for large-scale solar PV projects can sometimes be located in remote areas where the required skilled workers do not live near the Project site, workers' accommodations may need to be constructed on-site. Workers' accommodations require consideration of siting issues as discussed above, provision of potable water and availability of wastewater, and solid waste disposal services.

Screening. The significance of the impacts that ancillary facilities may have and their potential cumulative effects need to be considered during the screening process as they could have an effect of a project's category classification. The length and route of a transmission line or access road, outside the Project boundary, and their impact on the siting criteria discussed above, will determine if effects related to ancillary facilities would result in a Category A or B classification.

Potential social impacts that may result from worker housing should be considered including impacts on community infrastructure, health, and safety. Depending on the size, duration and potential risks

associated with workers' accommodations, impacts from workers' accommodations may be considered during classification of a project as Category A or Category B.

Impact Mitigation. For access roads and transmission lines, IFC's EHS Guidelines for Toll Roads and for Electric Power Transmission and Distribution should be consulted and recommendations applied.

For workers' accommodations, projects should adhere to international standards for worker housing such as "Workers' Accommodation: Processes and Standards: A Guidance Note by IFC and the EBRD" ([http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_WorkersAccommodation/\\$FILE/workers_accomodation.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_WorkersAccommodation/$FILE/workers_accomodation.pdf)).

4.6 Cumulative Effects

Description of Impact. Often specific regions with good solar resources will have more than one solar project proposed and cumulative impacts should be considered. Cumulative effects can also result from the additive effects of other activities from different projects in a region, or secondary development that is likely to occur as a result of project development, each of which taken individually may not create significant impacts, but taken together could result in considerable impacts.

Screening. Having more than one large-scale solar PV facility within the same area or community can significantly exacerbate environmental and social impacts. Cumulative impacts from ancillary features should also be considered. If there are potential significant adverse impacts to the environment or nearby communities due to cumulative effects, a project may be classified as Category A rather than Category B.

Applicable Guidelines and Standards. The potential for cumulative impacts should be identified during the Project's environmental and social assessment process. Opportunities exist to reduce land-clearance impacts through shared use of power transmission lines, substations and access roads. Monitoring plans and procedures should take into account the cumulative effects.

Section 5.0 - Information Needed from the Project Applicant

Information that can be supplied by a project applicant that would assist OPIC in the screening and review of any proposed solar PV project includes:

- **Technical information on solar modules**
 - Manufacturer.
 - Type of cell used in the module panel.
 - Number of modules to be installed on site.
 - Specifics about the installation (i.e. tracking or non-tracking, spacing of modules).
 - Whether or not there will be on-site storage of electricity.
- **Project site**
 - Exact location including latitude and longitude coordinates.
 - Current land use of the site including whether or not there are existing structures on the site that will need to be removed and other impacts of land clearing.
 - Presence of protected/endangered plants or animals on the site.
 - Proximity to protected areas, sensitive ecosystems or areas of cultural significance.
 - Proximity to closest residence/neighborhood.
 - Information regarding physical or economic displacement of any person or persons.
 - Information regarding potential impacts on indigenous peoples.
 - Information regarding how the land for the Project was acquired.
 - Any public meetings held with nearby residents and issues that arose.
- **Project impacts**
 - Specifics on the Project installation such as how the cables connecting panels will be installed and depth of holes for mounting the panels.
 - Plans for disposal of solid waste and sewage.
 - Measures to control erosion.
 - Presence and storage of hazardous substances on site.
 - Amount and source of water needed for the Project including potable water for drinking and water for panel washing.
 - Plans to screen the facility from nearby residences.
 - Whether or not a social and environmental impact assessment, social and environmental management plan, social and environmental policy and grievance mechanism have been prepared for the Project.
 - Whether or not an Occupational Health and Safety plan has been prepared for the construction and/or operational phase of the Project.
 - Whether or not a Life and Fire Safety plan has been prepared for the Project.

- **Connection to the electrical grid and other related infrastructure needed for the Project**
 - Description of any on-site substation to be constructed.
 - Complete description of how the Project will tie into the existing power transmission system including whether or not there will be construction of a transmission line, its length, its route and who is responsible for the construction of the line.
 - Whether or not roads will be constructed for the Project and their length and width.
 - Whether or not there will be worker housing needed on site and the plans for the construction of that housing.
- **Disposal of panels and batteries**
 - How panels will be disposed of at the end of their life (i.e. recycled, landfilled).
 - Description of plans for battery disposal if there is on-site battery storage.

Section 6.0 - Monitoring Recommendations

Because each project and site is unique, monitoring requirements should be determined on a project-by-project basis and should be largely based on the significant issues that were identified during the environmental and social impact assessment of the Project.

In general, monitoring for a solar PV project may include the following:

- **Construction phase**
 - Monitor that occupational health and safety measures are carried out in accordance with IFC's General Environmental, Health and Safety Guidelines.
 - Monitor that impacts from construction such as erosion and sedimentation, solid and sanitary waste disposal, hazardous materials (including fuels and lubricants) management, are being mitigated in accordance with IFC's General Environmental, Health and Safety Guidelines Erosion.
 - If applicable, monitor that any cultural heritage that may be found or affected during construction is treated in accordance with IFC P.S. 8.
 - Respond to and record community grievances.
 - If applicable, monitor habitat and species impacts in accordance with IFC P.S. 6 and/or the Project's biodiversity management plan.
 - If applicable, monitor that temporary worker housing is constructed and maintained in accordance with Workers' Accommodation: Processes and Standards: A Guidance Note by IFC and the EBRD.
- **Operation phase**
 - Monitor for potential cumulative impacts.
 - Ensure that restoration of any disturbance during construction has occurred.

Section 7.0 - Resources

<p>Presence of critical or sensitive habitat</p> <p>Socio-cultural issues</p> <p>Visual impacts</p> <p>Disposal of the modules</p> <p>Impacts related to the construction of ancillary facilities</p> <p>Cumulative effects</p>	<p>Bosatra, M, Fazi, F, Lionetto, P.F, Travagnin, L. (2010): Utility Scale PV and CSP Solar Power Plants Performance, Impact on the Territory and Interaction with the Grid. Foster Wheeler Italiana, Milan, Italy. http://www.fwc.com/publications/tech_papers/files/TP_Solar_10_01.pdf</p> <p>Bright Source Energy. (2009): Utility-Scale Solar: Reducing Risk for Utilities. BSE, 2111 E Highland Ave – Suite 170 Phoenix, AZ 85016 http://www.swhydro.arizona.edu/renewable/presentations/thursday/rasmussen.pdf</p> <p>Bureau of Land Management. (2011): Renewable Energy and the BLM: SOLAR. U.S. Department of the Interior, 1849 C Street NW, Washington, DC 20240. http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION_/energy.Par.28512.File.dat/Fact_Sheet_Solar_Oct_2011.pdf</p> <p>Bureau of Land Management. (201): Solar Energy. U.S. Department of the Interior, 1849 C Street NW, Washington, DC 20240. http://www.blm.gov/wo/st/en/prog/energy/solar_energy.html</p> <p>Cacadu District Municipality. (2011): Land Use and Locational Policy for Renewable Energy Projects: Cacadu District Municipality: CDM Renewable Energy Seminar: 2011. http://cacadu.co.za/assets//UrbanDynamics/URBAN_DYNAMICS.pdf</p> <p>California Energy Commission. (2011): Large Solar Energy Projects. California Energy Commission. 1516 Ninth Street, MS-29 Sacramento, CA 95814-5512. http://www.energy.ca.gov/siting/solar/index.html</p> <p>California Native Plant Society. (2011): Conservation Program, Desert: Solar Energy Development. California Native Plant Society. 2707 K Street, Suite 1, Sacramento, CA 95816-5113. http://www.cnps.org/cnps/conservation/desert.php</p> <p>European Commission. (2010): Renewable Energy: Studies-Land Use Change. http://ec.europa.eu/energy/renewables/studies/land_use_change_en.htm</p> <p>Federal Aviation Administration. (2010): Technical Guidance for Evaluating Selected Solar Technologies at Airports. Airport Planning and Environmental Division (APP-400) 800 Independence Avenue, SW Washington, DC 20591. http://www.faa.gov/airports/environmental/policy_guidance/media/airport_solar_guide_print.pdf</p> <p>Government of South Australia: Renewables SA: Renewable Energy Resource Map. Government of South Australia, GPO Box 2343, Adelaide SA 5001 Level 7, 131-139 Grenfell Street, The Conservatory, Adelaide SA 5000. http://www.renewablesa.sa.gov.au/investor-information/resources</p> <p>Ministry of Environments and Forests, Government of India. (2011): Environmental Information Division. Paryavaran Bhavan, CGO Complex, Lodhi Road, New Delhi - 110 003. http://moef.nic.in/index.php</p>
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Section 8.0 - Glossary of Terms - Solar

Categorically Prohibited Project - A project of the type listed in Appendix B of OPIC's Environmental and Social Policy Statement where potential adverse environmental or social impacts of the Project preclude OPIC support.

Category A - Category A projects are likely to have significant adverse environmental and/or social impacts that are irreversible, sensitive, diverse, or unprecedented. In the absence of adequate mitigation measures, Category A projects are considered higher risk.

Category B - Category B projects are likely to have limited adverse environmental and/or social impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures. Category B projects are considered medium risk. For these reasons, the scope of OPIC's environmental and social assessment for a Category B project is narrower than that required for Category A projects.

Concentrated Photovoltaic (CPV) Systems - Systems that concentrate sunlight on solar cells, greatly increasing the efficiency of the cells. The photovoltaic cells in a CPV system are built into concentrating collectors that use a lens or mirrors to focus the sunlight onto the cells. CPV systems must track the sun to keep the light focused on the PV cells.

Concentrating Solar Power (CSP) Systems - Systems that use the sun as the heat source to boil water and produce electricity. There are three main types of concentrating solar power systems; linear concentrators, dish/engine, and power tower systems.
http://www.nrel.gov/learning/re_csp.html

Critical Forest Areas - A type of Natural Forest that qualifies as Critical Natural Habitat. Critical Forest Areas include, but are not limited to, primary Forests and old growth Forests that may serve as critical carbon sinks.

Critical Natural Habitats - (i) Existing internationally recognized protected areas, areas initially recognized as protected by traditional local communities (i.e. sacred groves), and sites that maintain conditions vital to the viability of protected areas (as determined by the environmental assessment procedure); and (ii) sites identified on supplementary lists by authoritative sources identified by OPIC. Such sites may include areas recognized by traditional local communities (i.e. sacred groves), areas with known high suitability for biodiversity conservation and sites that are critical for vulnerable, migratory or endangered species. Listings are based on systematic evaluations of such factors as species richness, the degree of endemism, rarity, and vulnerability of component species, representativeness and the integrity of ecosystem processes.

Cultural Heritage - Tangible property or sites having archaeological (prehistoric), paleontological, historical, cultural, artistic and religious value, as well as unique environmental features that embody cultural values, such as sacred groves. Cultural heritage also includes intangible forms of culture, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

Economic Displacement - Loss of assets or access to assets that leads to loss of income sources or means of livelihood.

Environmental and Social Action Plan (ESAP) - A systematic program designed to prevent, mitigate and monitor anticipated environmental and related human impacts of prospective and ongoing activities. Required on all Category A projects.

Environmental and Social Impact Assessment (ESIA) - A comprehensive analytical body of work designed to evaluate environmental impacts of major projects having the potential to have significant, diverse, and irreversible impacts on the natural environment and on humans dependent on that environment. An ESIA is required for all Category A projects involving new ("greenfield") developments or significant expansion of existing facilities.

Environmental and Social Management System (ESMS) - Part of a project's overall management system that includes the organizational structure, responsibilities, practices and resources necessary for implementing the Project-specific management program developed through the environmental and social assessment of the Project.

Forest - An area of land not less than 1.0 ha with a tree crown cover (or equivalent stocking level) of more than 10 percent that has trees with the potential to reach a minimum height of 2 meters at maturity *in situ*. A forest may consist of either closed forest formations, where trees of various and all plantations that have yet to reach a crown density of 10 percent or tree height of 2 meters are included under forest, as are areas normally forming part of the forest area that are temporarily destocked as a result of human intervention such as harvesting or natural causes but that are expected to revert to forest. The definition includes forests dedicated to forest production, protection, multiple uses, or conservation, whether formally recognized or not. The definition excludes areas where other land uses not dependent on tree cover predominate, such as agriculture, grazing, or settlements. In countries with low forest cover, the definition may be expanded to include areas covered by trees that fall below the 10 percent threshold for canopy density, but are considered forest under local conditions.

Fragmentation of Habitat - The emergence of discontinuities (fragmentation) in an organism's preferred environment (habitat), causing population fragmentation. Geological processes that slowly alter the layout of the physical environment can cause habitat fragmentation. Sahney, S, Benton, M.J. & Falcon-Lang, H.J. (2010). "Rainforest collapse triggered Pennsylvanian tetrapod diversification in Euramerica" (PDF). *Geology* 38 (12): 1079–1082. doi:10.1130/G31182.1.

Industry Sector Guidelines - Technical reference documents issued by the International Finance Corporation with general and industry specific performance levels and measures.

Natural Forests - Forest lands and associated waterways where the ecosystem's biological communities are formed largely by native plant and animal species and where human activity has not essentially modified the area's primary ecological functions.

Performance Standards - Technical reference documents issued by the International Finance Corporation with environmental and social impact management performance criteria.

Photovoltaic (PV) Cell Technology - Utility-scale solar PV technologies convert energy from sunlight directly into electricity, using large arrays of solar panels. Solar PV technologies convert solar energy into useful energy forms by directly absorbing solar photons, particles of light that act as individual units of energy, and converting part of the energy to electricity. Solar PV is particularly well suited to off-grid applications, making it ideal for rural electrification.

Physical Displacement - Relocation or loss of shelter.

Project - All facilities owned or controlled within a physical project boundary that constitute a commercially viable business unit eligible for OPIC support.

Project Affected People - Individuals, workers, groups, or local communities that is or could be affected by the **Project**, directly or indirectly, including through cumulative impacts. Emphasis should be placed on those who are directly and adversely affected, disadvantaged, or vulnerable.

Renewable Energy - Energy supplied from renewable energy sources, such as wind and solar power, geothermal, and hydropower not *otherwise* categorically prohibited, and renewable biomass, but does not include nuclear power.

Visual Effects - “Visual effects relate to the changes that arise in the composition of available views as a result of changes to the landscape, to people’s responses to the changes, and to the overall effects with respect to visual amenity” (LI-IEMA, 2002).

Appendix A

Flowchart

**Screening Flow Chart
Solar Power Projects**

