

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

January 31, 2012

Acknowledgements

These guidelines were developed with the technical support of:

Knight Piésold and Co.

1999 Broadway, Suite 600
Denver, Colorado 80202 USA
Telephone:(303) 629-8788
Facsimile:(303) 629-8789
E-mail: denver@knightpiesold.com

Overseas Private Investment Corporation Environmental Guidance Renewable Energy – Biofuel Projects

Table of Contents

	Page
Section 1.0 - Introduction	1-1
1.1 Project Definition	1-1
1.2 Summary of Significant Issues.....	1-2
1.3 Scope of the Guidelines	1-2
Section 2.0 - Standards and Guidelines	2-1
Section 3.0 - Screening.....	3-1
3.1 Categorically Prohibited	3-1
3.2 Category A or Category B	3-1
Section 4.0 - Significant Issues and Mitigation Measures	4-1
4.1 Presence of Critical or Sensitive Habitat on or Adjacent to the Site	4-1
4.2 Invasive and Non-Native Species	4-1
4.3 Land-Use Conversion	4-2
4.4 Planting and Harvesting Considerations.....	4-2
4.5 Socio-Cultural Issues	4-3
4.5.1 Land Acquisition	4-3
4.5.2 Indigenous Peoples and Cultural Heritage	4-3
4.6 Water Use, Water Supply, and Water Quality Issues	4-4
4.7 Air Quality and Greenhouse Gas Emissions.....	4-4
4.8 Wastewater	4-5
4.9 Agrochemicals.....	4-5
4.10 Ancillary Facilities.....	4-6
4.11 Cumulative Effects	4-6
Section 5.0 - Information Needed from the Project Applicant.....	5-1
Section 6.0 - Monitoring Recommendations.....	6-1
Section 7.0 - Resources.....	7-1
Section 8.0 - Glossary of Terms - Biomass.....	8-1

Appendices

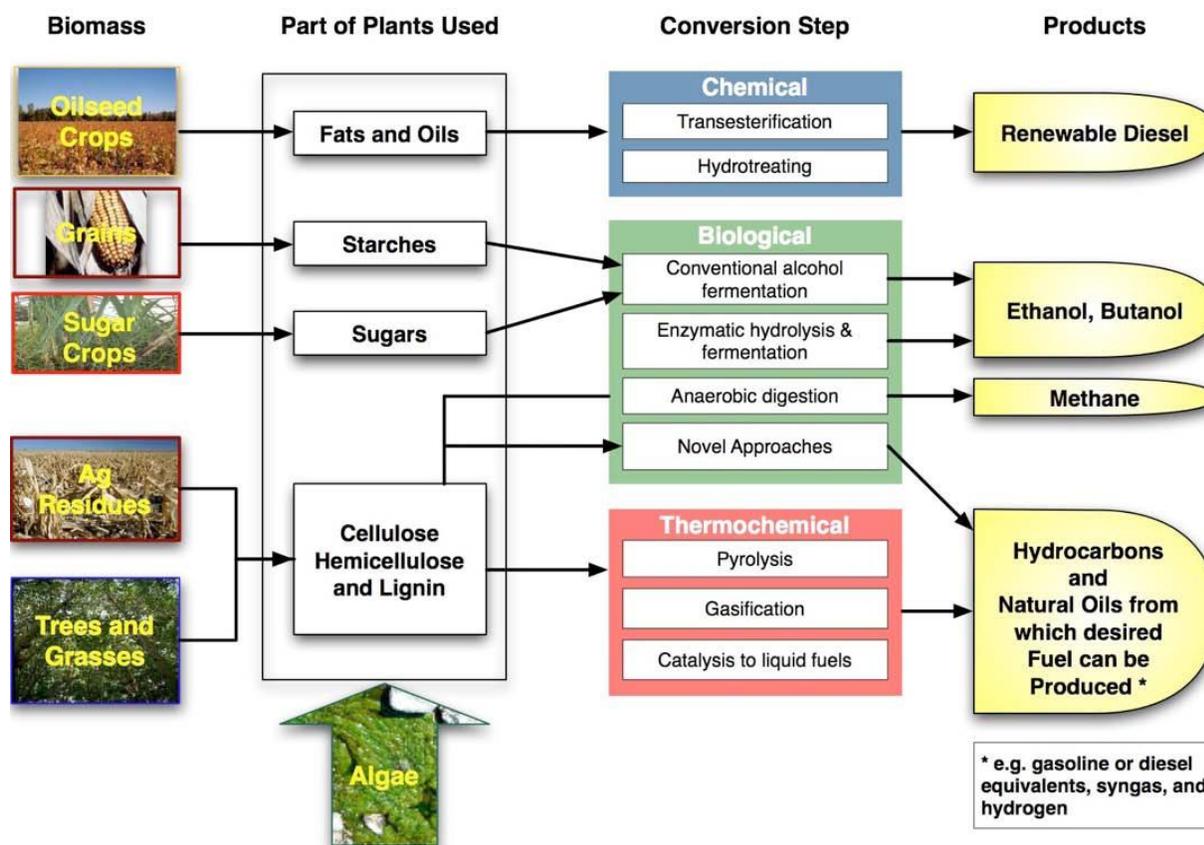
Appendix A Flowchart

Overseas Private Investment Corporation Environmental Guidance Renewable Energy – Biofuel Projects

Section 1.0 - Introduction

1.1 Project Definition

These guidelines apply to projects that produce biofuels. Biofuels are combustible materials directly or indirectly derived from biomass, commonly produced from plants, animals, and microorganisms, but also from organic wastes. Biofuels may be solid, liquid, or gaseous. The figure below summarizes various types of biomass, how they are converted, and the fuel products they produce.



Sheehan, J. (VP Strategy & Sustainable Development) LiveFuels™ Inc. November 27, 2007
Presented at NREL Energy Policy Forum Golden, CO.

Biofuels are commonly classified according to their current or future availability as first, second, or third-generation biofuels. Second and third-generation biofuels are also called “advanced” biofuels. First-generation biofuels are commercially produced using conventional technology. The basic feedstocks are seeds or whole plants from crops, such as corn, sugar cane, rapeseed, wheat, sunflower seeds, or palm oil. Second-generation biofuels can be produced from a variety of non-food sources. These include waste biomass, such as the stalks of wheat, corn stover, wood, and special energy crops, such as *Jatropha*. Second-generation biofuels use biomass-to-liquid technology, which employ thermochemical

conversion (mainly to produce biodiesel) or fermentation (i.e. to produce cellulosic ethanol). Other technologies are under development, such as those that can be used to produce biohydrogen, biomethanol, bio-based dimethyl ether (Bio-DME), and bio-based dimethylfuran (Bio-DMF). Third-generation biofuels include alcohols, such as bio-propanol or bio-butanol which, due to lack of production experience, are not anticipated to be relevant fuels on the market before the year 2050 (Assessing Biofuels, United Nations Environment Project, 2009).

These guidelines primarily concern first-generation biofuels, although many issues may be relevant to other biofuel generation processes. Additionally, these guidelines focus primarily on the agricultural production of biofuels, although environmental and social impacts associated with the processing component of biofuel production are also discussed.

The scope of biofuel 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 biofuels, with a focus on the agricultural component of growing the fuel, and reflect the information contained in the International Finance Corporation's General Environmental, Health and Safety Guidelines, International Finance Corporation's Performance Standards and other relevant standards and guidelines (2007).

These features include:

- Presence of critical or sensitive habitat on or adjacent to the site.
- Introduction of invasive or non-native species.
- Land-use conversion.
- Planting and harvesting considerations.
- Socio-cultural issues.
- Water use, including volume, source, and quality.
- Air quality and greenhouse gas emissions.
- Impacts related to wastewater.
- Impacts related to agro-chemical use.
- Impacts related to the construction of ancillary facilities including pipelines, roads, or transmission lines.
- Cumulative effects.

1.3 Scope of the Guidelines

These guidelines present potential environmental and social issues associated with biofuel 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 biofuel 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 biofuel projects. Each project is distinct, and therefore, will have environmental and social issues that are associated exclusively with that particular Project.

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, biofuel 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

OPIC's Environmental and Social Policy Statement requires that biofuel projects satisfy certain criteria to be considered renewable.

These include:

- The fuel must be produced from renewable biomass.¹
 - The fuel must be used to replace or reduce the quantity of fossil fuel present in a transportation fuel, heating oil, or jet fuel.
 - The fuel must have lifecycle greenhouse gas (GHG) emissions that are at least 20 percent less than 2005 EPA baseline GHG emissions.
- **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** (for both the agricultural and processing phases of the Project).
[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)
-

¹ Renewable biomass includes:

- Crops harvested from agricultural land cleared or cultivated prior to December 19, 2007 and that was non-forested and either actively managed or fallow on December 19, 2007.
 - Planted trees and tree residue from a tree plantation that was cleared at any time prior to December 19, 2007.
 - Animal waste material and animal byproducts.
 - Slash and pre-commercial thinning from forestland that is not ecologically sensitive.
 - Biomass (organic matter that is available on a renewable or recurring basis) obtained from the immediate vicinity of buildings and other areas regularly occupied by people or public infrastructure, in an area at risk for wildfire.
 - Algae.
 - Separated yard waste and food waste including recycled cooking and trap grease and separated municipal solid waste.
-

Other guidelines that may be applicable for biofuel projects are dependent on the source of the biomass and may include:

- **IFC's Environmental, Health, and Safety Guidelines for Forest Harvesting Operations.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ForestHarvesting/\\$FILE/Final+-+Forest+Harvesting+Operations.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ForestHarvesting/$FILE/Final+-+Forest+Harvesting+Operations.pdf)
- **IFC's Environmental, Health, and Safety Guidelines for Plantation Crop Production.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ForestHarvesting/\\$FILE/Final+-+Forest+Harvesting+Operations.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ForestHarvesting/$FILE/Final+-+Forest+Harvesting+Operations.pdf)
- **IFC's Environmental, Health, and Safety Guidelines for Annual Crop Production.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_AnnualCropProduction/\\$FILE/Final+-+Annual+Crop+Production.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_AnnualCropProduction/$FILE/Final+-+Annual+Crop+Production.pdf)
- **IFC's Environmental, Health, and Safety Guidelines for Vegetable Oil Processing.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_VegetableOilProcessing/\\$FILE/Final+-+Vegetable+Oil+Processing.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_VegetableOilProcessing/$FILE/Final+-+Vegetable+Oil+Processing.pdf)

For those biofuel projects that involve the production of end products either in addition to or, under certain economic conditions, as an alternative to biofuels, including sugar, soap, or vegetable oil, additional guidelines may apply, such as:

- **IFC's Environmental, Health, and Safety Guidelines for Oleochemicals Manufacturing.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_OleochemicalsManufacturing/\\$FILE/Final+-+Oleochemicals+Manufacturing.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_OleochemicalsManufacturing/$FILE/Final+-+Oleochemicals+Manufacturing.pdf)
- **IFC's Environmental, Health, and Safety Guidelines for Sugar Manufacturing.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_SugarManufacturing/\\$FILE/Final+-+Sugar+Manufacturing.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_SugarManufacturing/$FILE/Final+-+Sugar+Manufacturing.pdf)

Other guidelines relevant to ancillary infrastructure include applicable provisions of:

- **IFCs 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/$FILE/Final+-+Electric+Transmission+and+Distribution.pdf)
- **IFCs Environmental Health and Safety Guidelines for Toll Roads.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_TollRoads/\\$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)

Finally, there are a number of international multi-stakeholder initiatives that are underway in the various commodity sectors, such as palm oil, soy, and sugarcane, which have the objective of establishing standards to make these sectors more sustainable throughout their supply chain. There are also more advanced guidelines in the management of forests, should they be disturbed during project construction or operation. These initiatives and guidelines aim to set performance targets for the sector by identifying and promoting better management practices. As of the writing of this guidance, many of these initiatives and guidelines are still in draft form; however, they outline sustainable management practices that should be considered in the design of projects.

These initiatives and guidelines include:

- Roundtable on Sustainable Palm Oil (RSPO).
<http://www.rspo.org>
- Better Sugar Cane Initiative.
<http://www.bonsucro.com/>
- Roundtable on Responsible Soy.
<http://www.responsiblesoy.org>
- Alliance for Forest Conservation and Sustainable Use.
<http://www.forest-alliance.org/>

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

Biofuel 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/pa/pa_products/wcpa_categories/)
[\(http://www.iucn.org/about/work/programmes/species/red_list/\)](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 biofuel project is further screened and categorized as either Category A or Category B.

3.2 Category A or Category B

Category A biofuel 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 to have the Project audited by an independent third party.

Large-scale biofuel projects are more likely to be screened as Category A because they have a greater potential to adversely impact habitat and communities on a broad scale.

Additional issues that require careful consideration in determining whether a biofuels project is Category A or B include the following:

- Potential for significant habitat alteration or wildlife disturbance, including disruption of wildlife migration corridors.
- Potential for adverse impacts to biodiversity through introduction of invasive or non-native species
- Potential for land-use conversion issues.
- Potential impacts from planting and harvesting.
- Potential for significant socio-cultural impacts related to land acquisition, land use, indigenous peoples, and cultural heritage.
- Potential for significant community and environmental impacts related to water supply and water quality.
- Potential for significant community and environmental impacts from air and greenhouse gas emissions.
- Potential for significant environmental impacts resulting from improper treatment and disposal of wastewater.
- Potential for significant environmental and human health impacts from use of agro-chemicals.
- 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.

Modifications of project design, advanced planning in siting, and operation mode may be used to avoid or significantly reduce adverse impacts of biofuel projects. A biofuel project may be screened as Category B by OPIC if significant impacts are avoided, adequately mitigated, 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 Mitigation Measures

This section describes environmental and social evaluation features associated with biofuel projects (both impacts associated with the planting, growing, and harvesting of the crop used for fuel and the impacts associated with processing of the product into fuel), 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. Impacts to habitat due to the siting of biofuel projects will vary greatly depending on location and the amount of land to be disturbed either for crop cultivation or the production facility. The presence of vulnerable or endangered species on or near the site and/or the proximity of the site to potentially sensitive habitat (i.e. wetlands, surface water bodies) can have bearing on the impact of the Project.

Additionally, long-term displacement and fragmentation of habitat as a result of pipeline, road, and transmission line construction could further exacerbate project impacts. Short-term impacts to wildlife and vegetation may result from sediment and erosion (during the development phase) and agro-chemical applications, but these impacts may be mitigated to acceptable levels by implementing recommended mitigation measures.

Screening. OPIC cannot support projects that involve conversion or degradation of Critical Forest Areas or forest-related Critical Natural Habitats. Nor can OPIC support 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 magnitude and extent of impact and species located in or near the habitat or corridors are considered in determining the classification of the Project.

Impact Mitigation. Habitat alteration for biofuel projects has the potential to be significant depending on the size, location, and environmental features of the site and associated facilities such as roads, pipelines, or transmission lines. To the greatest extent possible, critical and sensitive habitats should be avoided. Additional mitigation measures to minimize impacts to habitat are described in IFC's Environmental, Health and Safety Guidelines for Electrical Power and Distribution, Toll Roads, Forest Harvesting Operations, Plantation Crop Production and Annual Crop Production.

4.2 Invasive and Non-Native Species

Description of Impact. Impacts from the introduction of invasive and/or non-native species can be a significant environmental threat to biodiversity since invasive species frequently spread rapidly and out-compete native species.

Screening. Projects involving introduction of non-native species will require the preparation of a risk assessment to determine the probability of the crop becoming invasive and whether or not there are adequate measures to mitigate for this potential impact. If adequate mitigation does not exist, OPIC may decline to support the Project. Otherwise, eligible projects may be screened as Category A if the risk of spreading of the non-native species is determined to be high.

Impact Mitigation. Planting of invasive or non-native species for fuel crop should be avoided. In cases where non-native species are introduced, mitigation measures derived from the risk assessment should be implemented in addition to requirements laid out in IFC's P.S. 6.

4.3 Land-Use Conversion

Description of Impact. The need to convert land from prior uses is an important consideration in screening and assessment. Conversion of natural habitat to monoculture farming may reduce biodiversity and ecosystem services including those related to soil quality and food security. Conversion of agricultural land previously used for food-crop cultivation may reduce the amount of food available to local communities and increase the cost of basic foodstuffs, especially if arable land is in scarce supply in the area. The conversion of land can affect the eligibility of a project, whether a project is screened as Category A or B and whether or not a project is classified as "renewable," per OPIC's Environmental and Social Policy Statement.

As mentioned in Section 2, OPIC's Environmental and Social Policy Statement, feedstock for a biofuels project must come from previously disturbed land in order to be considered as "renewable." Specifically, feedstock can be crops harvested from agricultural land cleared or cultivated prior to December 19, 2007 and that was non-forested and either actively managed or fallow on December 19, 2007 or planted trees and tree residue from a tree plantation that was cleared at any time prior to December 19, 2007. Projects that do not meet these requirements are not considered "renewable" fuel projects for the purposes of OPIC policy.

Screening. If a project involves conversion of land currently being used for food production, particularly if the food is consumed by the local economy, the Project is more likely to be screened as Category A and depending on the severity of the impact, OPIC may decline to support the Project. Projects that may result in significant adverse impacts on biodiversity or ecosystem services are also more likely to be screened as Category A.

Impact Mitigation. Projects involving renewable energy generated from renewable biomass should consider the local crop market to minimize food security issues and strains on the local food economy. In addition, biofuel projects should obtain biomass from land that was already disturbed and not in use to grow food.

4.4 Planting and Harvesting Considerations

Description of Impact. There are other considerations in the planting and harvesting of biofuel crops that should be considered and that can impact the sensitivity of a project.

These include:

- Whether or not the crop planted is permanent, multi-year, or annual.
- Whether or not crops are rotated.
- Whether or not burning is used as a method to prepare a field for planting.

Of the three types of crops - permanent, multi-year and annual - permanent crops tend to have the least environmental impact whereas annual crops that must be planted each year (i.e. corn) tend to have the highest impacts. Multi-year crops, which grow for a series of years without significant reductions in yield (i.e. sugar cane), are less problematic than annual crops.

The way in which a crop is harvested can also affect the environmental impact of a biofuels project. Projects that plant crops on hilly land or plant crops that are unable to be harvested mechanically may be considered as more environmentally and socially sensitive. Land that is unable to be harvested

mechanically frequently requires burning, which has associated air quality and safety impacts. Additionally, a project on land that cannot be harvested mechanically is likely to have intensive labor requirements and may be sensitive from an occupational, health, and safety perspective.

Screening. If impacts from planting and harvest planning and design are determined to be significant, a project may be screened as Category A.

Impact Mitigation. Projects can mitigate impacts from planting and harvesting by choosing to plant lower impact crops, permanent or multi-year crops, or by planting on lands which do not require burning for preparation and which can be harvested mechanically.

4.5 Socio-Cultural Issues

4.5.1 Land Acquisition

Description of Impact. The large land requirements of most biofuel projects for the cultivation of crops that are to be used as fuel can cause significant social impacts, including economic impacts if the Project results in loss of income or livelihood or physical impacts if people on the Project's site are required to move to another location. 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.

Screening. Land acquisition procedures, physical or economic displacement of people, and/or impacts on their livelihood due to 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 owners 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, which could be diminished as a result of the establishment of a biofuel project.

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

4.6 Water Use, Water Supply, and Water Quality Issues

Description of Impact. Depending on the crop and location of the Project, some projects may require significant amounts of water for irrigation. Projects requiring irrigation will be most problematic if located in arid or water-scarce regions. Additionally, the processing of biofuels may require large quantities of water. Applicants will be required to demonstrate that there are adequate water resources for the Project and that there will be no impact to other users of the local water source.

Sedimentation and erosion due to land use conversion and agricultural activities can degrade water quality if runoff leads to a surface water body.

Screening: Projects where the annual volume of groundwater abstracted amounts to 10 million m³ or more are screened as Category A. If a project withdraws water from surface water or ground water and it is determined that, as a result, downstream users are significantly adversely impacted, the Project may be screened as Category A.

Impact Mitigation: Biofuel projects should be developed and operated with an aim to increase production while minimizing water use and adverse impacts on water quality and quantity. The following measures should be incorporated into project design to mitigate impacts:

- Sites should be chosen where water is available with minimal impacts to surrounding water users.
- Studies should be prepared documenting that the Project will not cause unacceptable impacts.
- Crops should be selected that are appropriate given the availability of water at the site.
- Water conservation techniques, such as water recycling and re-use, should be employed. For the agricultural component of a biofuels project, this should include the use of efficient irrigation methods.
- For a biofuel processing facility, water recycling and employing equipment that minimizes water use should be used whenever possible.
- The use of potable water for production processes should be avoided when possible.
- All facilities should incorporate water conservation in project design.
- Projects should prepare erosion control and harvesting plans.

4.7 Air Quality and Greenhouse Gas Emissions

Description of Impacts. Air emissions from biofuel projects are generated from the land preparation, road and facility construction, crop planting, and harvesting. Air quality impacts may be most significant in the production phase of the Project. Frequently biofuels production processes have large energy and steam requirements, which require boilers and auxiliary generators on site. Particulate matter, VOCs, NO_x, and SO_x are all pollutants that are generated from these fossil-fuel combustion sources. Greenhouse gas emissions that result from the use of fossil fuels in boilers or generators on site will be subject to OPIC's greenhouse gas policy requirements, including annual cap allocation and Category A screening thresholds.

Screening. Projects using fossil fuels will be screened as a Category A if direct emissions from fossil fuel fired boilers or generators exceed 100,000 tons of CO₂ annually. The proximity of sensitive air quality receptors to the Project site may also affect a project's screening determination.

Mitigating Impacts. Applicants should develop an air quality control plan and demonstrate that there are adequate air quality emissions mitigation control and prevention measures in place to avoid any violation of IFC air quality standards. Projects should identify the proximity of any sensitive air quality receptors.

Additional recommended measures to mitigate impacts to air quality are provided in the IFC guidelines. In general, mitigation should include the following considerations:

- Agricultural projects should adopt tillage methods that reduce CO₂ release from soil, when possible.
- Open burning of agricultural wastes should be avoided.
- Appropriate pollution control should be employed on all boilers and generators used in the processing of the biofuels.
- Whenever possible agricultural wastes rather than fossil fuels should be used in boilers and generators.
- If the Project involves combustion of fossil fuels, particulate matter, VOCs, NO_x, and SO_x should be monitored.
- Energy conservation measures should be employed in all processing facilities to minimize energy use and decrease emissions.

4.8 Wastewater

Description of Impact. Wastewater associated with the processing of biofuels will vary depending on the conversion process; however, production cycles often result in wastewater with high content of organic material and residues, high biochemical oxygen demand (BOD), and high chemical oxygen demand (COD). Additionally, wastewater resulting from the processing of biofuels may have high concentrations of suspended solids, organic nitrogen, oils, and fats, and may contain pesticide residues from the treatment of the agricultural product.

Screening: As long as wastewater is handled according to IFC guidelines and appropriate mitigation is implemented, wastewater issues should not result in a project being screened as Category A.

Mitigating Impacts: Projects should be designed considering potential need for on-site wastewater treatment plants or the need for pretreatment prior to discharge to municipal facilities. The IFC guidelines for the Oleochemical Manufacturing and Vegetable Oil Processing provide specific mitigation measures with respect to wastewater that should be employed.

4.9 Agrochemicals

Description of Impacts. The use of agrochemicals (i.e. insecticides, herbicides, fungicides, fertilizers) can result in serious health and ecological risks. Agrochemical runoff can cause eutrophication in nearby water bodies and has the potential to endanger aquatic species and drinking water. Some agrochemicals bioaccumulate in fish tissues, and therefore, represent a potential risk to humans if those fish are consumed. Agrochemicals may also leach into the soil and reach groundwater. Those agrochemicals that persist could reach intakes for drinking water supplies and concentrations could exceed levels protective of human health. Health risks associated with agrochemical handling and application can be high if farm workers are not provided with appropriate training and personal protective equipment.

Screening. The use of any agrochemical deemed illegal under host country laws or regulations or international conventions and agreements or subject to international phase-outs or bans is categorically

prohibited. Proper mitigation applied to the use and management of other agrochemicals should assist in screening a project as Category B.

Impact Mitigation. Appropriate agrochemical management is the key to reducing impacts. The IFC EHS Guidelines on Plantation Crop Production describe specific mitigation measures with respect to pesticide and fertilizer use and application. The following general mitigation measures should be applied to projects:

- Projects should develop Integrated Pest Management Plans.
- Alternatives to agrochemical application should be considered whenever possible.
- Measures, such as crop rotation and pest resistant crops, should be used whenever possible.
- Projects should avoid the use of agro-chemicals that fall under the World Health Organization Hazard Class 1a and 1b.
- Appropriate erosion control should be employed to minimize runoff to nearby water bodies.
- Appropriate training of personnel in the management and application of agrochemicals should be employed.

4.10 Ancillary Facilities

Description of Impact. Ancillary features, including pipelines, access roads, and transmission lines to the main grid, can result in significant land use disturbances, visual intrusions, and wildlife impacts. In addition, because sites for biofuel projects can sometimes be located in remote areas or the required skilled workers do not live near the Project site, workers' accommodations may be needed. 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 on a project's category classification. The length and route of a pipeline, 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)

4.11 Cumulative Effects

Description of Impact. In cases where more than one biofuel project is proposed within the same area or community, cumulative impacts should be considered. Large biofuel projects located in close proximity to each other can result in significant adverse cumulative impacts with respect to impact to sensitive habitat, biodiversity, land use conversion, ambient air quality, and water availability and quality. 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 biofuel project 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.

Impact Mitigation. 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 transmissions lines, substations, and access roads. Monitoring plans and procedures for biodiversity, air emissions, water use, and impact to water quality should take into account the cumulative effects of these impacts.

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 geothermal project includes:

Project site (both the agricultural site, if relevant, and the site of the production facility).

- 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. If the site is already in agricultural production, provide crop and length of time the land has been farmed. If the Project will result in a change from one crop to another describe what that will be and when it will occur. If the site is to be cleared, the vegetation currently on site and as much detail available on the number of trees, shrubs, etc., that will be cleared.
- All studies or assessments conducted on the vegetation and species located on the agricultural sites.
- Presence of protected/endangered plants or animals on the site.
- Presence and/or proximity to wildlife migration corridors.
- Proximity to important wildlife habitat areas, including Special Protected Areas (SPAs) and statutorily designated or qualifying International or National sites for nature conservation, including: Natura 2000 sites.
- Proximity to protected area or area of cultural significance.
- Proximity to closest residence/neighborhood, particularly proximity of residents/neighbors to significant hydrogen sulfide emissions sources.
- Description of procedures for measuring and monitoring noise and potential impact on nearby residents and any controls that will be on the equipment to minimize noise.
- 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.
- Information relating to the surrounding topography.
- Information regarding planned expansion or presence of other biofuel projects, existing or planned, in the Project area of influence.

Project impacts

- Description of the production process if there is one associated with the Project.
- The size of the production facility and the quantity of product that will be produced.
- Quantity and source of water needed by the industrial production cycle of the Project.
- Whether or not the agricultural portion of the Project will irrigate crops, and if so, quantity and source of water.
- Type of irrigation system to be used (i.e. drip, sprinkler, gravity, etc.).
- Any studies conducted that show the impacts of water used for processing or irrigation will not impact local users.
- All water conservation methods employed both at the agricultural production site and at the processing facility.
- Details on how the agricultural crop will be harvested (i.e. mechanically or manually).

- How agricultural residues both from farming and during the production process will be handled.
- Specific plans for treatment of wastewater from the processing facility, whether or not onsite treatment will be required, and plans for monitoring effluents.
- Plans for disposal of all solid wastes from agricultural and production processes.
- Measures that will be implemented to control erosion.
- Presence and storage of hazardous materials on site and in use during the production process.
- Whether or not an emergency response plan has been prepared, providing the plan if available.
- List of all agrochemicals to be used and quantities to be applied.
- Whether or not an Integrated Pest Management Plan has been prepared for the agricultural operations; providing the plan if available.
- All boilers or electrical generators on site, their size, fuel, and hours of operation. All plans for monitoring emissions.
- Any energy conservation measures that will be employed in the processing facility.
- All associated infrastructure that will be constructed as part of the Project (i.e. roads, ports, pipelines, transmission lines, and their routes and size), whether the facility is being constructed for the sole purpose of the Project, and details of who is responsible for the construction of the facility.
- Whether or not there will be worker housing needed on site and the plans for the construction of that housing.
- Description of how the product will be moved from the fields to the processing facility, whether or not those vehicles will be owned by the Project, and approximate length of transport, and frequency of transport.
- Description of how the product will be moved from the manufacturing facility to the final market and whether or not the Project developer will be responsible for that transport, its approximate length, number of trips, gallons transported, and transportation route.
- Whether or not a social and environmental impact assessment, social and environmental management plan, social and environmental policy, and community grievance mechanism have been prepared for the Project; provide if available.
- Whether or not an Occupational Health and Safety Plan has been prepared for the construction and/or operational phase of the Project; provide if available.
- Whether or not a Life and Fire Safety Plan has been prepared for the Project; provide if available.

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 biofuel 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.
- 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

- Ensure that restoration of any disturbances during construction has occurred.
- Ensure proper storage of agrochemicals and any fuels.
- Monitor agrochemical usage and handling in accordance with project's Integrated Pest Management Plan.
- Ensure proper training and provision of personal protective equipment for workers.
- If applicable, monitor habitat and species impacts in accordance with IFC P.S. 6 and/or the Project's Biodiversity Management Plan and Harvesting Plan.
- Monitor air emissions, quality of treated wastewater (if treated on-site), water use, fuel use, noise levels to nearest receptors (i.e. residences, neighbors).
- Monitor impacts from transportation of product from site to processing facility and from processing facility to final destination.
- Respond to and record community grievances.
- Monitor cumulative impacts.

Section 7.0 - Resources

Presence of Critical or Sensitive Habitat	Alliance for Forest Conservation and Sustainable Use. http://www.forest-alliance.org/
Introduction of Invasive or Non-Native Species	Better Sugarcane Initiative (2009). http://www.bonsucro.com/
Land-Use/Conversion	
Planting and Harvesting Considerations	EPFL Energy Center (2009): Roundtable on Sustainable Biofuels. September 2009.
Socio-Cultural Issues	European Biofuels Technology Platform: Biofuels and Sustainability Issues.
Water Use, including Volume, Sourcing and Quality	http://www.biofuelstp.eu/sustainability.html
Air Quality Emissions	European Committee on Standardization.
Impacts Related to Wastewater	http://www.cen.eu/cen/Pages/default.aspx
Impacts Related to Agro-Chemical Use	European Commission: Biofuels: Standards. http://ec.europa.eu/energy/renewables/biofuels/standards_en.htm
Impacts Related to the Construction of Ancillary Facilities	Food and Agriculture Organization of the United Nations (2008): The State of Food and Agriculture 2008.
Cumulative Effects	Inter-American Development Bank. IDB Biofuels Sustainability Scorecard.
	New Zealand: Energy Efficiency and Conservation Authority: Biofuels Specifications and Regulations. http://www.eeca.govt.nz/programmes-and-funding/programmes/renewable-transport-energy/biofuels/specifications-and-regulations
	Roundtable on Sustainable Palm Oil (RSPO). http://www.rspo.org
	Roundtable on Responsible Soy. http://www.responsiblesoy.org
	Stockwell, R. (2009): Transportation Biofuels in the United States: An Update, The Minnesota project. August 2009.
	The National Academies (2007): Water Implications of Biofuels Production in the United States. October 2007.

Section 8.0 - Glossary of Terms - Biomass

Bioaccumulate - The accumulation of a substance, such as pesticides or other organic chemicals in a living organism. <http://www.merriam-webster.com/medical/bioaccumulation>

Biofuel - Combustible materials directly or indirectly derived from biomass, commonly from plants, animals and microorganisms, but also from organic wastes. Biofuels may be solid, liquid, or gaseous.

Biohydrogen - Hydrogen produced biologically, most commonly by bacteria.

Biomass - Plant materials and animal waste used especially as a source of fuel.

Biomethanol - Methanol produced from plants such as sugar cane or corn, used as an alternative to gasoline.

Bio-based dimethyl ether (Bio-DME) - A biofuel that can be produced from waste biomass and even household trash.

Bio-based dimethylfuran (Bio-DMF) - An organic molecule currently being considered for use as an energy source obtained from various sources which include plant matter, such as: starch and cellulose. <http://biodmf.com/>

Bio-butanol - Biofuel alcohol produced from biomass and other waste streams.

Bio-propanol - Biofuel alcohol produced from biomass and other waste streams.

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.

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.

Endemic Species - A species that is only found in a given region or location and nowhere else in the world. <http://www.biodiversity-worldwide.info/endemism.htm>

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. An ESAP is 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.

Eutrophication - The natural or artificial process by which a body of water acquires a high concentration of nutrients (i.e. phosphates and nitrates) typically promoting excessive growth of algae.

Forest - An area of land not less than 1.0 hectare 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 stories and undergrowth cover a high proportion of the ground, or open forest. Young natural stands 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.

Invasive Species - Plants that frequently spread rapidly and out-compete native species. An invasive exotic species is non-native and is likely to cause economic, environmental, or human health harm.

NO_x - is a generic term for the mono-nitrogen oxides NO and NO₂ produced from the reaction of nitrogen and oxygen gases in the air during combustion, especially at high temperatures.

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.

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, which are 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. OPIC's Environmental and Social Policy Statement requires that biofuel projects satisfy certain criteria to be considered renewable. These include:

- The fuel must be produced from renewable biomass.
- The fuel must be used to replace or reduce the quantity of fossil fuel present in a transportation fuel, heating oil, or jet fuel.
- The fuel must have lifecycle greenhouse gas emissions that are at least 20 percent less than 2005 EPA baseline lifecycle greenhouse gas emissions.

SO_x - Generic term for a variety of sulfur oxides, including the following: Lower sulfur oxides (S_nO, S₇O₂ and S₆O₂), sulfur monoxide (SO), sulfur dioxide (SO₂), sulfur trioxide (SO₃), or higher sulfur oxides (SO_{3+x} where 0<x≤1).

Volatile Organic Compounds (VOCs) - Emitted gases from certain solids or liquids that are known to have adverse health effects. <http://www.epa.gov/iaq/voc.html>

Appendix A
Flowchart

Screening Flow Chart Biofuel Projects

