Environmental Due Diligence (EDD)

Of Renewable Energy Projects

GUIDELINES

for

Biogas Systems

Release 1.0

UNEP
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BASE

Environmental Due Diligence (EDD) process for Biogas Systems

Definition and background

Environmental Due Diligence (EDD) is the collection and assessment of data relative to environmental conditions or impacts prior to a transaction to identify and quantify environment-related financial, legal, and reputational risks.

Banks have put in place a number of instruments to manage risk. One of these instruments is commonly termed a **Due Diligence** review. This term, as well as its practice, originates from the U.S. and refers to the background work (investigation, analysis, and verification) done by a prudent entrepreneur, owner, executive, or lender when making a decision. The general intention of a due diligence review is to ensure that a projected investment does not carry financial, legal, or environmental liabilities beyond those that are clearly defined in an investment proposal. The environmental component of the due diligence procedure is referred to as environmental due diligence (EDD). Originally, lenders or investors used EDD to manage environmental risks and liabilities stemming from an investment decision. Recently, it has become a way for financial institutions to incorporate environmental and social considerations in their investment review process.

EDD has become largely standardised for many sectors, but not for all. There is a growing realisation in energy and environmental policy and research circles that procedures for environmental due diligence of Renewable Energy Technologies (RETs) are poorly defined and financiers must often adopt *ad hoc* procedures for environmental review. Although most renewable energy technologies are environmentally sound in theory, all of them can have negative impacts on the environment if poorly planned.

The Environmental Due Diligence process

The process consists of three stages (Figure 1)

1. Establishing the regulatory framework
2. Environmental appraisal
3. Monitoring the project after approval

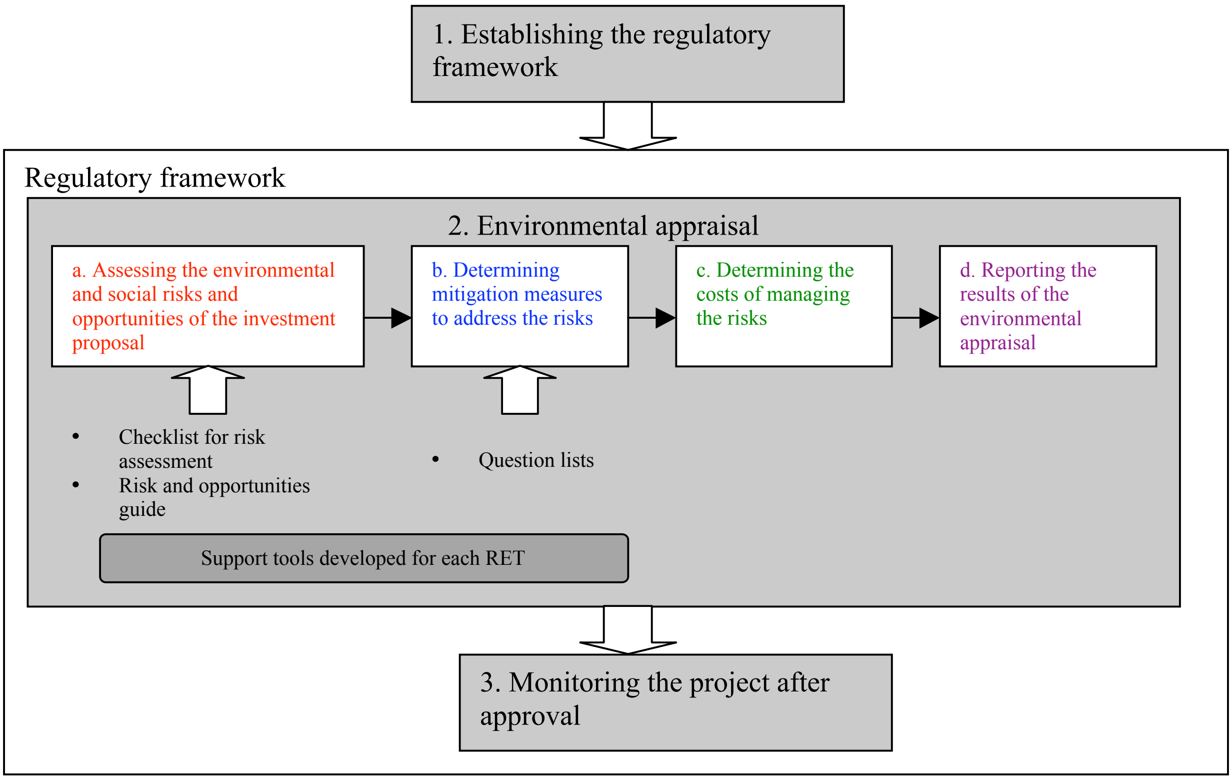

Figure 1: Procedure for environmental due diligence of RET investments

1. The first stage of the procedure is establishing the relevant regulatory framework for the project, including national regulations, international standards, and good practice guidelines.

The environmental laws provide the background for determining the main issues that should be considered during the environmental appraisal process. Environmental regulations, standards and guidelines provide practical information concerning emission limits, permitting requirements, pollution abatement and control techniques and equipment, best management and operational practices, etc., against which the investment proposal should be benchmarked. Two timeframes must be considered for this process: first, that of existing laws and regulations that currently affect the project, and second, that of anticipated laws and regulations (e.g. in process of development, discussion, or approval) that may change the conditions under which the project must operate.

2. The second stage is the core of the entire process. It comprises four main steps: a) assessing the environmental risk; b) determining mitigation measures; c) estimating the cost of risk management; and d) reporting the results.

To facilitate the first two steps of this stage a number of new EDD tools are proposed. These tools are intended to complement, not replace, any EDD tools currently used for environmental review procedures. In addition, it is important to note that since these tools are intended for general use, they may not reflect all the possible environmental and/or social issues related to a particular investment. The analyst should incorporate additional issues as needed.

3. The third stage is the monitoring and environmental evaluation of the project. This procedure serves two main purposes: a) to ensure that the project sponsor complies with the applicable environmental standards and various environmental components of operations included in legal agreements; b) to keep track of ongoing environmental impacts associated with project operations and of the effectiveness of any mitigation measures.

EDD Guidelines for Biogas Systems

The guidelines for EDD of biogas systems follow the three stages shown in Figure 1.

These guidelines are specifically intended for systems in which a process of anaerobic bacteriological fermentation (anaerobic digestion) converts a biomass feedstock into a gas commonly referred to as biogas. [1] Biogas consists primarily of methane (50-70%), carbon dioxide (25-35%), and trace amounts of nitrogen, sulphur compounds, volatile organic compounds, and ammonia. It has the heat value of its methane component, and may be used directly as a heat fuel or in internal combustion engines.

A wide range of feedstocks may be used for biogas production:

- Agricultural feedstocks: animal wastes, crop waste
- Industrial feedstocks: food processing wastes (vegetables, cheese, meat), slaughterhouse wastes, sugar
- Municipal feedstocks: Urban sewage sludge and municipal solid wastes[2]

The guidelines will consider the environmental impacts associated with the processes of anaerobic digestion and biogas collection, but not those associated with the agricultural or industrial activities that originate the organic waste used for anaerobic digestion. For the specific case of municipal feedstocks, the guidelines will not consider the impacts of landfills, or sewage sludge treatment facilities.[3]

The guidelines do not cover the gasification of biomass through any other process (e.g. pyrolysis). [4]

1. Regulatory framework for the project

The regulatory framework for the guidelines consists of the current and anticipated national and regional laws, international standards, and best practice guidelines.

2. Environmental appraisal of the project

This stage comprises **four main steps:** a) assessing the environmental risk, b) identifying risk management measures, c) estimating the cost of risk management, and d) reporting the results.

a) Assessing the environmental and social risks and opportunities of the project

The objective of this task is to provide an initial evaluation of the environmental risks and opportunities presented by a particular biogas project. The expected outcome of this step is a

[1] The process of anaerobic digestion occurs naturally in swamps, waterlogged soils and rice fields, deep bodies of water, and in the digestive systems of termites and large animals. It can also be managed under controlled conditions in a "digester" (an airtight tank), a covered lagoon (e.g. a pond used to store manure) for waste treatment, or a landfill sites or sewage treatment facilities. The primary benefits of anaerobic digestion are nutrient recycling, waste treatment, and odour control. Except in very large systems, biogas production is a highly useful but secondary benefit.

[2] Municipal solid waste contains significant portions of organic materials that produce a variety of gaseous products when dumped, compacted, and covered in landfills. The product of anaerobic digestion that takes place at a landfill site is commonly referred to as landfill gas. However, it is important to note that municipal feedstocks may also be used as fuel for digesters.

[3] The impacts of the industrial, agricultural or municipal activities that produce the organic waste used as feedstock occur irrespective of whether biogas is produced or not.

[4] The environmental burdens and opportunities of biomass gasification through partial combustion are covered in the guidelines for biomass energy systems based in energy crop and in agricultural and forestry residues.

matrix that provides the analyst with an estimate of the risk potential of a project with respect to a number of potential environmental issues.

Two tools have been developed to aid the investment analyst in this task.

Table 1 provides a list of potential environmental issues that may be associated with a biogas project. The issues have been divided into four categories: effluent emissions, on-site contamination and hazardous materials issues; biodiversity protection issues; worker health and safety issues; and environmental issues sensitive to public perception. The table provides a checklist of information that an analyst may use to determine the risk potential of each issue for the project in review. This information may be contained in the documentation provided by the project developer, for example, in an EIA or other type of environmental assessment report that may accompany the proposal; or it may be ascertained during on-site field visits, stakeholder meetings, etc. Other possible sources of information include media reports, telephone conversations, electronic or post mail, etc. In any case, the responsibility for providing relevant information to the satisfaction of the analyst rests ultimately with the project developer/sponsor.

In some cases, the table also provides best practices and/or mitigation measures that could be planned, proposed or carried out on-site to manage a particular issue. It is important to note, however, that these best practices/measures are generic and therefore only meant for illustrative purposes.

Other important information to be used to assess the risk potential of a biogas system includes
- impending environmental legislation that may affect the project;
- the environmental liability regime of the host country; and
- project sponsor characteristics including previous compliance problems and history of accidents.

The risk potential of each issue is to be rated using the following key:

Risk Rating Key

Key	Definition	Characteristics
L	Low/no risk potential.	Information availability: Excellent (the issue is well documented) Environmental impact: Little to no negative environmental impact in case of occurrence Probability of occurrence: Low to non-existent Mitigation/compensation measures: readily available and considered in proposal
L-M	Low to moderate risk potential.	Information availability: Excellent to good (the issue is adequately documented) Environmental impact: Temporary/reversible damage in case of occurrence Probability of occurrence: Low (estimated at less than 20%) Mitigation/compensation measures: readily available and considered in proposal

M	Moderate risk potential	Information availability: Good (documentation is adequate, but may require improvement (e.g. clarification, addition)) Environmental impact: Temporary/reversible damage in case of occurrence Probability of occurrence: Estimated between 20-40% Mitigation/compensation measures: Readily available, but not considered in proposal
M-H	Moderate to high risk potential	Information availability: Requires improvement (there is little or no documentation pertaining to the issue, or the information requires clarification or addition) Environmental impact: Potential for adverse impacts although to a lesser degree than **H** issues (e.g. impacts may be site-specific, mostly reversible, or with readily available mitigation measures). Probability of occurrence: Estimated between 20-60% Mitigation/compensation measures: Available, not considered in proposal
H	High risk potential	Information availability: Requires improvement (there is little or no documentation pertaining to the issue, or the information requires clarification or addition). Environmental impact: Potential for adverse impacts (the issue may become critical if not managed, e.g. it could affect more than the project site, pose irreversible environmental damages, affect sensitive flora, fauna, human communities, etc.) Probability of occurrence: Higher than 40% Mitigation/compensation measures: Not available from technical/logistical/financial/legal perspective/ or available, but not considered in proposal

The second table, **Table 2**, is a matrix where the user can fill in the appropriate letter (i.e. L, L-M, M, M-H, H) according to his/her estimation of the risk each issue presents for the project in review. The purpose of the table is simply to provide a snapshot of the environmental and social risks of a particular project and their corresponding risk rating at a particular point in time. This risk rating can help the investment analyst decide further actions in the EDD process.

Table 2 also presents a column of potential environmental opportunities of a project, to present a more balanced view of the environmental impact (both positive and negative) that may be attributed to a particular project.

The assessment of a certain risk potential will depend on the results of the review of relevant information, as well as on the analyst’s experience and common sense.

How to use the tables:

Table 1 contains a list of potential risks as well as information to help estimate the risk potential. Once the analyst makes this estimation, the appropriate letter is filled in Table 2.

Template of Table 1: Checklist for environmental risk assessment

Risk	Information to look for
1. Risk 1	Information 1
2. Risk 2	Information 2
3. ...	...
...	

Risk rating
L, M, H
to be entered here

Template of Table 2 (Matrix):

Activity	Environmental and social risks					Environmental opportunities
	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	
	1. H	L				
	2. M	M-H				

Table 1: Checklist for environmental and social risk assessment of biogas systems

Risks	Information to look for
Effluent emissions, on-site contamination, hazardous materials issues	
1. Methane emissions from waste storage facility	• Feedstock used for biogas production: Wet feedstocks typically emit greater amounts of methane during storage than dry feedstocks • Scale of the operation: the larger the scale of the storage facility, the more methane is produced during storage. • Design, operation and maintenance of waste storage facilities: Compliance with best operation and maintenance practices to minimize venting of methane from storage facilities.
2. Emissions of raw (unscrubbed) biogas from leaks in the gas collection system	• Chemical composition of raw biogas, particularly the concentration of hydrogen sulphide (H2S), which is toxic to humans, corrosive, and forms sulphur dioxide in the combustion process. The composition of the biogas will depend on the feedstock composition and digester's pH (e.g. for a manure sulphur content of 0.2% and digester pH of 7.2, the raw biogas can contain H2S in concentrations of nearly 2000 ppm. The OSHA's standard for maximum permissible exposure level is 20 ppm.) • Treatment of raw biogas planned/carried out on site: Scrubbing the raw biogas to eliminate its hydrogen sulphide and ammonia content will prevent the formation of corrosive sulphurous, sulphuric and nitrogen oxides, thus increasing the potential uses of the biogas. • Design, operation, and maintenance of gas collection facilities: Compliance with best practices to minimise venting. • Scale of the operation: Leakages are a potential problem of all biogas production facilities; however particular attention should be given to the design, operation and maintenance of small-scale facilities (e.g. small digester units in farms), which will generally operate under less strict environmental, health and safety controls than large-scale operations.
3. Contamination of surface and groundwater due to disposal of anaerobic digestion effluents: pathogens, particulate matter, COD/BOD	• Chemical composition of effluents: organic solids, inorganic salts, concentrations of hydrogen sulphide and ammonia, pesticides, pathogens, heavy metal content, etc. • Waste disposal practices planned/carried out on site: Best disposal practices include: compliance with best agricultural practices in case of use of effluents as soil conditioners or fertilisers to avoid overfertilization of soil and water ways; use of impermeably lined settling ponds; use of impermeably lined evaporation ponds in arid climates; wastewater treatment (usually only economically feasible for large-scale operations); discharge into public sewage treatment facilities, etc.
4. Emissions of nitrogen oxides, sulphur oxides, particulates, trace amounts of toxic materials, including mercury and dioxins due to biogas combustion	• Composition of raw biogas: the combustion process may affect the physical or chemical properties of the raw biogas components, thus resulting in the release of complex organic compounds such as dioxins, and heavy metals such as mercury. • Treatment of raw biogas planned/carried out on site: Scrubbing the raw biogas to eliminate its hydrogen sulphide and ammonia content will prevent the formation of corrosive sulphurous, sulphuric and nitrogen oxides, thus increasing the potential uses of the biogas. The following uses require scrubbing of biogas: addition to natural gas pipelines; use as fuel for internal combustion engines; use as fuel for gas turbines for electricity production.

Biodiversity protection issues	
–	–
Worker health and safety issues	
5. Occupational accidents due to methane emissions during waste storage: risk of fires, explosions, asphyxiation, poisoning	• Design, operation and maintenance of waste storage facilities: Compliance with good practice methods for waste handling to avoid venting of methane • Fire prevention measures in place (e.g. storage facility clearly marked with “Fire Hazard” signs and located away from possible ignition areas, emergency equipment on site, availability of secondary containment, etc.) • Operation and maintenance routines in place • Training of personnel • Emergency routines planned or established, particularly those implemented in case of fire, explosion, or medical emergencies including first aid treatment for poisoning or asphyxiation • Unsettled/unresolved worker compensation claims
6. Occupational accidents due to methane emissions during gas collection: risk of fires, explosions, asphyxiation, poisoning	• Design, operation and maintenance of gas collection facilities: compliance with best practice methods for biogas collection to avoid venting, minimization of pipe distances (e.g. locating gas collection facilities as near as possible to energy recovery facilities), compliance with best practice safety standards for biogas collection (avoiding leakage of biogas into confined areas) • Fire prevention measures in place (e.g. gas storage facility clearly marked with “Fire Hazard” signs and located away from possible ignition areas, emergency equipment, availability of secondary containment, etc.) • Operation and maintenance routines in place • Training of personnel • Emergency routines planned or established, particularly those implemented in case of fire, explosion, or medical emergencies including first aid treatment for poisoning or asphyxiation • Unsettled/unresolved worker compensation claims
Public perception issues	
7. Impacts on amenity due to waste storage: odour, visual intrusion, wind blown litter, attraction of flies and rodents	• Location of waste storage facilities (proximity to populated areas, human quarters, working areas, etc.) • Design, O&M of waste storage facilities (e.g. availability of secondary containment to avoid venting) • Employment of best practice methods for organic waste storage to reduce odour • Complaints from neighbours
8. Possible pathogen release due to leaching of organic wastes into soil, surface water and/or groundwater	• Design, O&M of waste storage facilities (e.g. availability of secondary containment, impermeable linings in slurry containment ponds) • Employment of best practice methods for organic waste storage (e.g. composting) to reduce pathogens • Siting of waste storage facilities (e.g. located away from human and livestock quarters or other vulnerable areas, etc.)

<table>
<tr><td>9. Public health issues: methane build up in residential areas (risk of fires and explosions) from leaks in gas collection systems</td><td>Location of gas collection facilities (proximity to populated areas, human quarters, working areas, etc.)
Design, operation and maintenance of gas collection facilities: compliance with best practice methods for biogas collection to avoid venting, minimization of pipe distances (e.g. locating gas collection facilities as near as possible to energy recovery facilities), frequent monitoring to ensure biogas leakage during normal operation conditions is held at near-zero levels
Emergency routines planned or established, particularly those implemented in case of fires and explosions (alerting/evacuation of local community in case of accidental releases that lead to methane build up)
Scale of the operation: Leakages are a potential problem of all biogas production facilities; however particular attention should be given to the design, operation and maintenance of small-scale facilities, which will generally operate under less strict environmental, health and safety controls than large-scale operations.</td></tr>
<tr><td>10. Impacts on amenity: odour and visual intrusion</td><td>Location of gas collection facilities (proximity to populated areas, human quarters, working areas, etc.)
Hydrogen sulphide content of raw biogas
Design, operation and maintenance of gas collection facilities: Compliance with best practice methods for biogas collection to avoid venting, minimization of pipe distances (e.g. locating gas collection facilities as near as possible to energy recovery facilities), frequent monitoring to prevent/minimize biogas leakage during normal operation conditions
Complaints from neighbours</td></tr>
<tr><td>11. Heavy metal/dioxin contamination of soil, surface water and groundwater due to disposal of anaerobic digestion effluents</td><td>Chemical composition of effluents: organic solids, inorganic salts, concentrations of hydrogen sulphide and ammonia, pesticides, pathogens, heavy metal content, etc.
Waste disposal practices planned/carried out on site: compliance with best practices such as use of impermeably lined settling ponds, use of impermeably lined evaporation ponds in arid climates; wastewater treatment (usually only economically feasible for large-scale operations); discharge into public sewage treatment facilities; avoiding discharge of effluents in waterways without their proper treatment, etc.</td></tr>
</table>

Table 2: Environmental and social risks and opportunities for a biogas system

Activity	Environmental and social risks				Environmental opportunities
	Effluent emission, onsite contamination, hazardous materials issues	**Biodiversity protection issues**	**Worker health and safety issues**	**Public perception issues**	
Waste storage	1. Methane emissions	–	5. Occupational accidents: risk of fires, explosions, asphyxiation, poisoning	7. Impacts on amenity: odour, visual intrusion, wind blown litter, attraction of flies and rodents 8. Possible pathogen release due to leaching of organic wastes into soil, surface water and/or groundwater	Anaerobic digestion contributes to establishing sustainable waste management systems. Using organic wastes as an energy source may reduce odour problems (because of the need to collect as much of the methane as possible); the risk of nitrate leaching; and the risk of spreading pathogens and parasites.
Gas collection	2. Emissions of raw (unscrubbed) gas from leaks in the gas collection system	–	6. Occupational accidents: risk of fires, explosions, asphyxiation, poisoning	9. Public health issues: methane build up in residential areas (risk of fires and explosions) 10. Impacts on amenity: odour, visual intrusion	Reduction of feedstock pollution potential: the digestion process reduces the amount of pathogens and worm ova contained in organic wastes, thus yielding a more benign sludge waste than the raw feedstock.

Table 2 (continued): Environmental and social risks and opportunities for a biogas system

Activity	Environmental and social risks				Environmental opportunities
	Effluent emission, onsite contamination, hazardous materials issues	**Biodiversity protection issues**	**Worker health and safety issues**	**Public perception issues**	
Disposal of effluents (liquid and solid digestates)	3. Contamination of surface and groundwater: pathogens, particulate matter, COD/BOD	–	–	11. Heavy metal/dioxin contamination of soil, ground and surface water	The solid digestate has significant potential for use as soil conditioner. It can also be further processed into a peat substitute compost, reducing the pressure on peat bogs (which are sensitive ecosystems) and improving the economics of the scheme The liquid digestate has potential for use as a fertilizer. Another potential use of the effluent is as animal feed. If the effluent is dewatered, the resulting cake has a high quality protein mix that may be used as animal fodder.
Combustion	4. Emissions of nitrogen oxides, sulphur oxides, particulates, trace amounts of toxic materials, including mercury and dioxins	–	–	–	Avoided CO2 emissions from deployment

b. Identifying risk management measures

Once the environmental and social risks of the project have been assessed, the next step is to identify what measures would be needed to eliminate, reduce, or manage those risks. In the case that the project sponsor has recommended measures for managing potential risks, the analyst must decide whether the measures are acceptable. If no or only inadequate risk-mitigation measures have been recommended, the project developer must modify the project to ensure satisfactory risk management.

Risk management measures may be identified through industrial or sectoral best practices, international or other widely used/accepted standards, etc. As mentioned in the previous section, Table 1 includes some mitigation/compensation measures, although the measures included in the table should not be considered as complete or exhaustive, but merely indicative.

The following question list may provide some assistance in determining the extent of compliance of the project with regulations, standards, and best-practice guidelines and protocols for risk management. The question list has been constructed in a modular form, with the first module containing general questions that should be answered for all projects, while subsequent modules should be applied only if considered necessary or relevant.

Table 3: Question lists for a biogas energy system

Level	Questions
LEVEL I: All projects	1. Has the project complied with all legislated requirements for operation, receiving all necessary licences and permits? (E.g. Operational permits, power production contracts and purchase agreements in case the facility is used for electricity production, land use permits, other requirements from local and national authorities, etc.)
	2. Are best practices followed for waste storage? (Marking fire hazardous areas, secondary containment to minimize possible methane venting, pathogen releases, parasites, fly and rodent attraction, odour emissions, etc.)
	3. Are prevention and mitigation measures for worker health and safety planned/followed at the waste storage site? During biogas production and collection? During biogas combustion? (Emergency plans, basic medical facilities on site, sanitary facilities, etc.)
	4. Are there proper operation and maintenance routines as the waste storage site? At the biogas production and collection facilities? (E.g. Maintaining near zero emission levels for methane and other potential pollutants (nitrogen oxides, sulphur oxides, heavy metals) during normal operation; waste handling and gas collection in accordance to best operation practices to minimize venting; frequent monitoring of emission levels from storage, production, collection and combustion sites; scheduling regular check-ups of storage facilities and building, anaerobic digestion equipment, gas collection equipment, pipelines, biogas storage facilities, combustion equipment and facilities; etc.)
	5. Is the project operator prepared to deal with emergency situations involving public health threats to the local community (e.g. alerting and evacuation routines)?

	6. Do the disposal methods planned/followed for the digestate take into account the following points: - Evaluation/selection of best disposal option in accordance with chemical composition of the digestate (organic solids, inorganic salts, concentrations of hydrogen sulphide and ammonia, pesticides, pathogens, heavy metal content, etc) - Best agricultural practices to avoid overburdening of soil and water in case of its use as soil conditioner or fertilizer (The use of the digestate as a fertilizer must be properly timed, carried out with suitable equipment, and applied in accordance with the soil's nutrient reserves) - Appropriate treatment of sludge in case of discharge into waterways
	7. Have all moderate and high risk issues identified in the previous stage, other than those that may have been covered in questions 1-6, been appraised and have mitigation measures been proposed?
Level II: Optional	8. Has an environmental impact assessment report, an environmental audit, or any similar environmental assessment been prepared with respect to the project? Is one required?
	9. Has a site visit been planned? Is one required?
	10. How can the environmental liability regime of the host country affect the financial institution?
	11. Have there been any protests or complaints about the project? If so, what have they focused on?
	12. What are the potential environmental benefits of the project? Is the general public aware of these environmental benefits?

c. Determining the costs of managing the risks

When the mitigation measures have been determined, the next step is to estimate the cost of the risks and their management. This includes both the real cost of the mitigation measure itself, as well as the potential costs associated with non-compliance (e.g. increased charges, fines and other penalties, the closure of an operation by environmental authorities, project delays due to permitting requirements, etc). Estimating such costs is important even if the financial institution or investor may not be directly responsible for them: first, any unforeseen costs can compromise the financial viability of the proposal; and secondly, the financial institution could be held liable under certain liability regimes.
How exact the cost calculation should be and the level of detail is up to the analyst.

The analyst must also take into consideration any future liabilities that could occur as a result of changed environmental legislation, regulations, and standards.

Costs should be determined on a case-by-case basis, depending on the results of the previous step.

d. Reporting the results

The third step of the environmental appraisal stage is to present the key findings of the EDD review in a report that can be used during the investment decision process. The final report should include at a minimum the following information:

- Brief description of the project
- General information about the project sponsor
- Status of compliance with host-country regulations, international standards, best-practice guidelines
- Main environmental impacts and proposed mitigation measures (including an assessment

of the adequacy of these mitigation measures if necessary or appropriate)

- An analysis of how the costs of the necessary mitigation measure affects the project's financial viability
- Environmental opportunities (potential benefits of the project)
- Any missing information that may be significant for the assessment of the environmental risks and opportunities of the project
- In the case of moderate and high-risk projects, the key findings should highlight high-risk potential issues and their mitigation measures, as well as the results of environmental assessment reports and site visits that may have been carried out during the review process.
- Further actions required by the financial institution or the project sponsor with respect to environmental issues

3. Monitoring the project

If the project has been approved, the final stage of EDD is the monitoring stage. For this purpose, specific provisions should be included in the legal documentation, for example, the requirement of annual environmental reports, independent environmental audits at specific intervals, site visits, etc. This is especially important for high-risk projects, for which the agreements between project sponsor and financial institution or investor should always include an environmental reporting and evaluation clause. In this case the monitoring should be carried out at regular intervals (e.g. annually or semi-annually), preferably including independent site visits or audits in addition to the project sponsor's environmental evaluation reports.

For low and moderate risk projects, environmental reports from the project sponsor on an annual or semi-annual basis should be sufficient.

Significant changes in the project (e.g. projected expansions, changes in technology), changes in the type of finance (e.g. from loan to equity), and/or foreclosures should **always** be preceded by a re-assessment of environmental risk. This is in order to determine whether the changed project carries environmental and social risks and opportunities that were not considered in the initial review. The environmental monitoring of the project should continue until the loan has been repaid, the financial institution or investor has divested its equity share in a company, or the operation has been cancelled.

Disclaimer

The UNEP Guidelines on Environmental Due Diligence of Renewable Energy Projects are intended to serve as a practical tool for identifying and managing environmental risks associated with renewable energy projects. They are not meant to supplant national or local environmental or permitting requirements. The EDD Guidelines are to be considered work in progress and UNEP and BASE will continue to improve and refine the Guidelines to make them as suitable and useful as possible for reviewing renewable energy projects.

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